

UNIVERSITY MICROFILMS  
SERIALS SECTION  
ANN ARBOR MI 48106

# The Annals of The American Academy of Political and Social Science

## Stabilization of Commodity Prices

AN INTERNATIONAL JOURNAL OF THEORETICAL AND APPLIED  
ECONOMICS, WITH SPECIAL REFERENCE TO CO-OPERATIVE  
ACTIVITIES, WITH A VIEW TO STABILIZING COMMODITY PRICES

EDITOR IN CHARGE OF THIS VOLUME:  
CARLOS C. WILSON, Ph.D., University of Pennsylvania,  
Shapiro Hall, Eastern Parkway of the American Academy



Volume CLXXII

SEPTEMBER, 1925

Number 221

## THE AMERICAN ACADEMY OF POLITICAL AND SOCIAL SCIENCES

**Origin and Purpose.** The Academy was organized on May 14, 1883, to provide a national forum for the discussion of political and social questions. The Academy does not take sides upon controversial questions, but aims to secure and present reliable information about the public in forming an intelligent and accurate opinion.

**Publications.** The Academy publishes annually two issues of THE ANNALS dealing with the most important current political and social problems. Each publication contains three groups of papers: (1) papers upon the entire general subject; (2) papers upon special subjects; (3) papers published by the Academy; they are written by distinguished scholars and are free expressions of opinion.

**Meetings.** The Academy holds scientific sessions annually during the winter months and it also holds an annual meeting which lasts over two full days and including six sessions. The papers of important value presented at the meetings are included in the Academy's publications.

**Membership.** The subscription price of THE ANNALS of the American Academy of Political and Social Science is \$10.00 per volume. Single copies are sold at \$2.50 each. THE ANNALS are sent to all members of the Academy, \$5.00 (or more) of the annual subscription being held for a contribution to the publications. Membership in the Academy may be secured by applying to the Secretary, 1201 G Street, N. W., Washington. The annual membership fee is \$5.00 and the life membership is \$500.00. Members not only receive the regular publications and the ANNALS, but are invited to all the meetings. Membership in the Academy is applied to the Editorial Council for the ANNALS of Political and Social Science.

---

*Issued Quarterly by the American Academy of Political and Social Science at Concord, New Hampshire.*

*Editorial Office: 1201 G Street, N. W., Washington, D. C.*

---

*Entered as Second-Class Matter, May 22, 1884, at Postoffice at Concord, N. H., under No. 104.  
Postpaid.*





V

# Stabilization of Commodity Prices

## The Annals

VOLUME CXXXIX

SEPTEMBER, 1928

EDITOR: CLYDE L. KING

ASSOCIATE EDITOR: JOSEPH H. WILLITS

ASSISTANT EDITOR: CHARLES P. WHITE

BOOK EDITOR: EDWARD B. LOGAN

EDITORIAL COUNCIL: C. H. CRENNAN, DAVID FRIDAY, A. A. GIESECKE, CHARLES G. HAINES,  
A. R. HATTON, AMOS S. HERSHEY, E. M. HOPKINS, S. S. HUEBNER, CARL KELSEY,  
J. P. LICHTENBERGER, ROSWELL C. MCCREA, ERNEST MINOR PATTERSON,  
L. S. ROWE, HENRY SUZZALLO, T. W. VAN METRE, F. D. WATSON

*Editor in Charge of this Volume*

CHARLES P. WHITE, PH.D., UNIVERSITY OF PENNSYLVANIA



THE AMERICAN ACADEMY OF POLITICAL AND SOCIAL SCIENCE  
3622-24 LOCUST STREET  
PHILADELPHIA  
1928

Copyright, 1928, by  
THE AMERICAN ACADEMY OF POLITICAL AND SOCIAL SCIENCE  
All rights reserved

#### EUROPEAN AGENTS

ENGLAND: P. S. King & Son, Ltd., 2 Great Smith Street, Westminster, London, S. W.

FRANCE: L. Larose, Rue Soufflot, 22, Paris.

GERMANY: Mayer & Müller, 2 Prinz Louis Ferdinandstrasse, Berlin, N. W.

ITALY: Giornale Degli Economisti, Milano, via Canova, 27.

SPAIN: E. Dossat, 9 Plaza de Santa Ana, Madrid.

# CONTENTS

FOREWORD.....	PAGE V
<i>PART I. INTRODUCTION</i>	
THE MEANING OF STABILITY.....	1
Charles P. White, Ph.D., University of Pennsylvania	
THE CAUSES AND EXTENT OF PRICE FLUCTUATIONS.....	7
Charles P. White, Ph.D., University of Pennsylvania	
INDUSTRIAL CHANGES DUE TO CHEMISTRY.....	15
Edward R. Weidlein, Director, Mellon Institute of Industrial Research, Pittsburgh, Pa.; President, American Institute of Chemical Engineers	
THE PRESENT LEGAL STATUS OF OPEN PRICE ASSOCIATIONS.....	34
Franklin D. Jones, Counsellor at Law, Washington, D. C.	
RECENT DEVELOPMENTS IN TRADE ASSOCIATION LAW.....	38
Gilbert H. Montague, Member, New York Bar	
<i>PART II. STABILIZATION BY COÖPERATIVE ACTION</i>	
PRICE STABILIZATION THROUGH TRADE ORGANIZATION AND STATISTICAL COÖPERATION.....	44
Myron W. Watkins, National Industrial Conference Board, Inc., New York City	
THE STATISTICAL WORK OF TRADE ASSOCIATIONS.....	51
Thomas W. Howard, Assistant Manager, Department of Manufacture, Chamber of Com- merce of the United States of America	
THE STATISTICAL WORK OF THE FEDERAL GOVERNMENT IN RELATION TO PRICE STABILIZATION.....	64
Mortimer B. Lane, Editor, <i>Survey of Current Events</i>	
ECONOMIC EFFECT OF SIMPLIFICATION IN THE PAVING BRICK INDUSTRY	71
E. L. Beller, Secretary, National Paving Brick Manufacturers' Association, Chicago, Ill.	
THE RELATION OF UNIFORM COST ACCOUNTING TO COMPETITION.....	74
C. W. Halligan, Manager, Accounting Department, The Rubber Association of America, New York City	
PRICE STABILIZATION IN OIL THROUGH CONTROL OF PRODUCTION.....	80
W. H. Voskuil, Assistant Professor of Industry, Wharton School of Finance and Commerce, University of Pennsylvania	
PRESENT PLANS FOR STABILIZING IN THE OIL INDUSTRY.....	87
Abram F. Myers, Federal Trade Commissioner; Member, Committee of Nine of the Federal Oil Conservation Board	
<i>PART III. THE INDIVIDUAL FIRM AND STABILIZATION</i>	
THE PROBLEM OF SEASONAL VARIATION.....	100
Charles P. White, Ph.D., University of Pennsylvania	
INDUSTRIAL FORECASTING.....	109
Charles P. White, Ph.D., University of Pennsylvania	
SHALL WE CONTROL DEMAND OR FOLLOW IT.....	126
Charles P. White, Ph.D., University of Pennsylvania	
<i>PART IV. GENERAL FACTORS AFFECTING STABILIZATION</i>	
HAND TO MOUTH BUYING.....	136
Charles P. White, Ph.D., University of Pennsylvania	



COMMODITY PRICE STABILIZATION AS A PROBLEM OF INSURANCE.....	146
G. Wright Hoffman, Assistant Professor of Insurance, Wharton School of Finance and Commerce, University of Pennsylvania	
THE RÔLE OF THE BANKER IN GUIDING PRODUCTION.....	152
J. W. Bell, Professor of Money and Banking, Northwestern University	
THE EFFECTS OF INSTALLMENT SELLING ON STABILITY.....	160
Wilbur C. Plummer, Assistant Professor of Economics, Wharton School of Finance and Commerce, University of Pennsylvania	
RELATION OF COMMODITY PRICES TO PRICE LEVEL.....	166
Amos E. Taylor, Assistant Professor of Finance, Wharton School of Finance and Commerce, University of Pennsylvania	
<i>PART V. SUPPLEMENT</i>	
PUBLIC CONSTRUCTION AND CYCLICAL UNEMPLOYMENT.....	173
F. G. Dickinson, University of Illinois	
BOOK DEPARTMENT.....	210
INDEX.....	221

## EDITOR'S FOREWORD

146  
152  
160  
166  
172  
178  
184  
190  
196  
202  
208  
214  
220  
226  
232  
238  
244  
250  
256  
262  
268  
274  
280  
286  
292  
298  
304  
310  
316  
322  
328  
334  
340  
346  
352  
358  
364  
370  
376  
382  
388  
394  
400  
406  
412  
418  
424  
430  
436  
442  
448  
454  
460  
466  
472  
478  
484  
490  
496  
502  
508  
514  
520  
526  
532  
538  
544  
550  
556  
562  
568  
574  
580  
586  
592  
598  
604  
610  
616  
622  
628  
634  
640  
646  
652  
658  
664  
670  
676  
682  
688  
694  
700  
706  
712  
718  
724  
730  
736  
742  
748  
754  
760  
766  
772  
778  
784  
790  
796  
802  
808  
814  
820  
826  
832  
838  
844  
850  
856  
862  
868  
874  
880  
886  
892  
898  
904  
910  
916  
922  
928  
934  
940  
946  
952  
958  
964  
970  
976  
982  
988  
994  
1000

ALTERNATING periods of boom and depression in business are harmful. Attempts to speed up production lead to lowered efficiency, greater waste of materials, increased wear and tear on machinery, and, oftentimes, to serious labor troubles; and when the boom is ended, other costs are placed on society because of idle plants and idle labor.

A start has been made by the government toward reducing the evil effects of such fluctuations by control over money and credit. The Federal Reserve Board exerts a very real influence on the price level through its open-market transactions and by changes in the rediscount rate. But its work does not stop there. By careful study of business and financial data, it does much to temper ill-considered optimism or pessimism of business men.

Valuable as these activities are, they must always be limited in scope. In the final analysis the real remedies for instable business conditions lie in the hands of business men themselves. What is the nature of these remedies, and what can the business man do, working alone, or with others, to reduce the ups and downs of business?

In the first place the problem is not the sole concern of the producer and the laborer. The consumer also has definite interest which has been protected in theory, at least, by restrictions set up in the various anti-trust laws. The present status of these laws are discussed in Part I.

Many coöperative activities tend to make competition more intelligent and to bring consumption and production into closer harmony with each other. As set forth in the second section, it is evident that the trade association is now engaging in many forms of activities which result in greater stability.

Certain of the maladjustments that exist can be remedied by more careful management on the part of the individual firm. In the past, the main interest of scientific management has been in planning and controlling production; to be complete, equal attention must be given to the study of demand, and methods for forecasting or controlling it. These activities Doctor White discusses in Part III.

In addition to the activities carried on by individuals or trade associations for the purpose of securing greater stability, there are a number of practices such as hand-to-mouth buying, installment selling, etc., which have a very definite bearing on the problem. The extent to which these practices aid or hinder movements toward stability are set forth in the fourth section.

Doctor Charles P. White, of the University of Pennsylvania, was chosen as Simon H. Patten Fellow of the Academy to make a study of the important phases of Price Stabilization by business men. This volume represents his work, and the thought of capable specialists in this field.

CLYDE L. KING.

I  
of  
de  
w  
w  
re  
re  
pr  
m  
no  
na  
in  
pe  
te  
re  
go  
go  
we  
pri  
tin  
19  
tio  
eco  
In  
duc  
cre  
dec  
or  
Wi  
per  
cha  
bro  
infl  
par  
inte  
nito  
pri  
wel  
bec  
cre

F  
F  
the

# The Meaning of Stability

By CHARLES P. WHITE, Ph.D.

University of Pennsylvania

EVENTS since 1914 have concentrated attention on the problem of price fluctuations. During this decade and a half prices have run the whole gamut of change. The overwhelming demand for war materials resulted in unheard-of increases in price, with corresponding decreases in more definitely peace-time goods and non-essentials. Methods used in financing the war brought inflation, and inflation brought increased prices for peace-time goods as well as war materials. At the end of hostilities the reverse shift was made. As soon as government control expired the price of goods used predominately in war underwent a severe reduction, while other prices, after a temporary setback, continued to soar until the break came in 1920. Since 1920 such price fluctuations as have occurred have been due to economic rather than monetary causes. In some lines there have been increases due to shortage of materials or to increased demand; in others, prices have declined because of excessive supplies or because of decreasing demand. Within this period, then, we have experienced the whole range of price changes; rising prices of all goods brought about by monetary causes—inflation—as well as rising prices of particular goods resulting from actual interference with supply or from definite increases in demand; and falling prices of all goods due to deflation, as well as decreases for particular goods because of increased supply or decreases in demand.

## EFFECTS OF PRICE FLUCTUATIONS

Because of the rapidity and extent of these fluctuations people have become

interested in the problem as never before. Rising prices stimulate production, lead to greater employment and create an appearance of prosperity; if the rise is sufficiently rapid and extensive, a number of fortunes are created. But experiences of the last decade have brought home the fact that such fortunes are very likely more than counterbalanced by losses, and that over-stimulated production leads to dullness and depression, with periods of idleness to set against periods of full-time and over-time employment. Rising prices mean greater waste of materials, increased wear and tear on machinery, higher labor costs, both financial and human, due to the greater strain of over-time work, and a growing inefficiency on the part of the whole economic organization. If the producer reaps high profits, we must remember that the consumer pays the bill. Some prospective purchasers are forced out entirely because they cannot pay the higher price, while others pay, but do so only by an inconvenient and oftentimes painful adjustment of other expenditures.

Falling prices, on the other hand, are hailed with delight by consumers. To producers and stockholders they mean idle factories, and shrinking profits, or actual losses; to workers, unemployment, and lack of income. In spite of the occasional gains which come, there is no question but that all classes would gladly forego their chances of gain in some periods in exchange for a guarantee against loss in others. Some few speculatively inclined producers, with a well-developed gambling instinct, might prefer the present conditions, but such ones are certainly in the

minority. The policy of most corporations to build up a surplus in order to maintain a steady rate of dividends, and the increasing tendency toward unemployment insurance, are reflections of the attitude that certainty, with perhaps lower returns, is preferable to uncertainty, with a chance for large incomes or losses.

#### ECONOMIC THEORY OF THE PRICE LEVEL MOVEMENT

In the past, most attention has been devoted to price fluctuations arising out of monetary conditions, and the remedies proposed have to deal with the price level rather than with prices of particular commodities. The leader among such movements in the United States is, of course, Prof. Irving Fisher, of Yale, who proposes to "stabilize" the dollar by defining it as a certain amount of purchasing power rather than as a certain weight of gold, and by changing the metal content of the dollar as the value of the metal in terms of commodities' changes. Supplementary to this plan, or rather, a make-shift to serve until the public can be educated to its feasibility, is the proposal that Congress instruct the Federal Reserve Board to maintain a stable price level by exercising its powers over credit through open market transactions, changing the rediscount rates, etc. This proposal, usually spoken of as the Strong Bill, has received serious consideration in the Committee on Banking and Currency of the House of Representatives, which has held extensive hearings to determine the merits of the plan.

These plans have three things in common: First, they are concerned with the price level, not with prices of particular goods. Second, they both attack the problem from the monetary side, assuming that price fluctuations are dependent primarily on the supply

of money and credit available, and third, that the remedy, therefore, lies in legislation and governmental or quasi-governmental control. At the same time that these plans were being discussed, another movement (or rather a series of movements), much less definite or deliberate, and less carefully planned, has been under way. This movement, while not closely articulated and rather sprawling in appearance, nevertheless has quite definite characteristics. For one thing, it is not concerned with the price level as such, but with the prices of particular commodities; it views the problem not from the monetary but from the economic angle, and as one to be solved, therefore, by control over production and consumption of goods exercised not by the government through legislation, but by the individual firm working alone or in coöperation with others in the same line.

The philosophy on which this movement is founded is unique, and those who participate in the movement have an attitude toward economic theory that is refreshing. They agree with those who repeat the stock phrase, "you cannot change economic laws," but go further and assert that the problem is not to change economic laws, but to recognize and control the conditions which give rise to the laws. The proposition that "price varies inversely with supply and directly with demand" is accepted, but this is considered only as the starting point. Neither supply nor demand is taken as fixed and unchangeable, but as subject to a large degree of control. Sometimes sales fall off because people get the idea that the consumption of a certain article has harmful effects, as has been the case with coffee and ripe olives. Since the problem is too large to be handled by one individual or firm, all producers may combine to form a research insti-



tute whose functions are (1) to determine whether the commodity does have harmful effects, and (2) if it does, to find methods for remedying the situation. The findings of the institute may then be broadcast through a coöperatively financed campaign. Again, if trade is being diverted to a new and competing product, as happened when electric refrigerators made serious inroads on the ice industry, the same research organization attempts to discover some point of superiority of the older product which will be stressed in similar campaigns. To prevent prices being established at ruinously low levels, education in cost accounting is engaged in, and the attempt made to have producers include all costs in the prices named. Sometimes it is discovered that declining sales and antagonism of consumers are due to activities of unscrupulous producers in adulterating or misbranding their products, or in using misleading advertising, and an attempt made to prevent such abuses by establishing uniform trade practices and rules of conduct. This group also recognizes that competition, if intelligent and honest, is really the life of trade, and leads to the survival of the fittest, but if blind, results in injury to fit and unfit alike. To make it less blind, therefore, attempts are made to furnish complete information regarding stocks on hand, costs, inquiries, etc.

Many real and lasting benefits are derived from these activities. If they did nothing more than substitute in part an interest in the welfare of the industry for the former selfish interest in the individual firm or plant, they would justify all the effort and money spent on them. The fact that they accomplish more by educating weaker producers, by eliminating waste, and by raising the standard of competition makes them all the more desirable. But in spite of these benefits, we must

remember that the interest of those concerned is still a narrow interest since it is restricted to an industry, and that many results which appear quite satisfactory to them are not desirable from the standpoint of society. Furthermore, many actions undertaken by one particular group tend to be "cancelled out" in effect by similar actions of another, as in competitive advertising. For these and other reasons, a broad survey is needed to discover, if possible, the actual results achieved by the various movements, and to analyze their merits from the viewpoint of society as a whole.

#### PRICE RELATIONSHIPS

For the purposes of the present study, there are two main questions to be answered: do the activities referred to really reduce fluctuations in price, and if they do, are less fluctuations desirable? Most discussions of the subject center around the word, stability, and deal with methods for "stabilizing" industry, or for securing "stable" prices. Usually no attempt is made to give them a precise meaning, but they are ordinarily used in contrast with conditions of fluctuating prices and rapid changes in industrial technique. Aside from this use in making comparison, there seems to be little or no uniformity. One person may tell us that the radio industry has been "stabilized," meaning thereby that it has reached the age of maturity and that no sensational inventions of new equipment or discoveries of new methods are to be expected. Another may assert that coal prices have been stabilized and mean that prices of coal are not supposed to rise or fall in the near future. A recent case in point occurred at the beginning of the year 1928 when many writers pointed out that the automobile industry had been "unstabilized" for many months be-

cause of Henry Ford's withdrawal from production; the presentation of his new model and the announcement of price cuts by his competitors, we were told, would soon restore stability.

An analysis of these uses of the terms shows that at bottom stability or instability is a question of *relationship*. With regard to the price level, we say that it is stable if our device for measuring it—index numbers—shows that a given sum of money will buy as many commodities this year as it did in some previous year. We may make our comparison between existing prices and prices in some fixed base year, such as 1890, 1913, or 1919, or we may change the base each year and compare this year's prices with those of the year immediately preceding. For some purposes the latter method is preferable, but in measuring stability the use of a fixed base is of advantage because it makes longer, continuous comparison possible. In either case, we are concerned with the relationship between the value of goods and of money, and with the relationship as it existed at one time in relation to some other time.

With regard to prices of individual commodities we are often concerned with the same type of *time relationship*—present prices in reference to past prices. More often, however, our concern is with the relationship between the price of some particular good and all other goods. Has the price of cotton kept pace with the rise in the price level? Have iron ore, and steel billets fallen more than other commodities? Of even more importance is the relationship between prices of competing products. To the brick manufacturer, changes in the price of cement, of lumber, of tile, as compared with changes in brick are of much more significance than changes in the price of all commodities, as shown by the price level, for they compete with his prod-

uct. Similarly, there is a definite relationship between the price of goods in the various stages of production, such as hides, leather, and shoes, or iron ore, steel billets, and wire nails, which is of considerable importance to the producers of the different articles.

Those who speak of stability seldom define the term or specify the type of relationship they have in mind. In most cases, perhaps, the reference is to a simple time relationship between the prices of a particular commodity, "stability" being used to indicate a stationary state of affairs or lack of change, the implication being that such a state would be very desirable. But are unchanging prices always desirable? Or is it likely that industry which makes no changes is the one which gives the most service to society? The answer in both cases is "no." In the present economic organization price serves very definite functions, one of which is to indicate the existence of a scarcity or an abundance of particular goods, and thus guide production. Rising prices for shoes, at a time when other prices are standing still, tell us that not enough shoes are being supplied. Guided by this indicator, producers withdraw from the production of hats, let us say, and engage in the making of shoes. The supply of hats, which are not in great demand, is reduced, and shoes, which are very much desired, are supplied in abundance. Equilibrium between the different goods has been restored, and it has been restored through the mechanism of price.

Another function performed by price is that of distributing the available supply of goods to those who want them most. There are not enough potatoes to supply everyone; who must do without? Under capitalism, with free enterprise and competition, the distribution is automatic. Prices rise;

those unwilling or unable to pay the higher price drop out, while those who can and do pay receive the goods.

Price changes appear, therefore, in a dual capacity. At times they seem to be a *cause* which either stimulates or retards production and consumption; at others, they appear as an *effect* which reflects changes in production or consumption. Whether cause or effect, the interaction is cumulative. Stimulation of consumption by a reduction in the price of goods produced under conditions of decreasing cost tends to make possible further reductions in price and falling prices once more stimulate consumption. On the other hand, rising prices due to increasing costs of production may so retard consumption that new resistances are developed and further price increases made necessary.

#### ARE PRICE CHANGES DESIRABLE?

To determine, then, whether price changes are desirable we must know why they have occurred. Falling prices for automobiles in recent years have injured no one, for they simply reflect better methods of production. At times new methods have been introduced so rapidly by leaders in the industry that less energetic or resourceful competitors have been forced out. This always involves a certain amount of loss, an individual loss to the investors who are unable to recover the capital they put in, loss of income to workers until they again secure employment, and the social loss due to the waste of fixed and specialized capital which cannot be converted to other uses. To offset these losses are the gains of the consumer in the form of more goods at lower prices. The losses are very temporary, and borne by the few; the gains are prolonged, and accrue to the consuming public at large.

As an example of this let us take the following hypothetical illustration:

	Year A	Year B
Number of units sold.....	10,000,000	15,000,000
Price per unit.....	\$2.00	\$1.50
Cost of production per unit.....	1.90	1.42½
Total price received.....	20,000,000	22,500,000
Total profit.....	1,000,000	1,125,000

In this case, price per unit has fallen 25 per cent, but even if other prices have not fallen at all, the industry is more prosperous for its total profit is greater than before. Total profits depend not on price alone, but are found by multiplying the margin between cost of production and price by the total number of units sold. Any plan, therefore, designed to "stabilize" prices by preventing all decreases would in many cases not only deprive the public of the advantages of lower costs of production, but would also injure the industry by keeping total sales and therefore total profits at a low figure.

In much the same way, any plan that attempts to "stabilize" prices without regard to changes in the price level is undesirable. Suppose that the price level has fallen 20 per cent. If this decrease has been distributed evenly so that the prices of most goods and services have declined an equal amount, the industry whose products have not declined 20 per cent and whose sales continue in the same volume is the gainer. If the net income of the business was \$50,000 before the fall in the price level and remains at that figure, it means that the real income of the business—the power to command goods and services—has increased 25 per cent. In the same way, the maintenance of stationary prices for any one product at a time when other prices are rising means lowered purchasing power for that industry unless stationary prices are accom-

panied by lowered costs or greater sales. An illustration of the type of problem that is involved is furnished by the post-war agricultural situation in the United States. The usual complaint is that farm prices have fallen farther than other prices, the assumption being that this fact alone proves that a calamity has occurred. But such a conclusion is justified only if the greater fall in farm prices is due to greater production or decreased demand for farm products, for if costs of production have decreased also, total purchasing power of the farm industry may be as great as before prices fell.

Rising prices are always viewed by consumers with disfavor. Socially, however, they must at times be considered necessary. When prices of oil, coal or other natural resources rise because the supply is being exhausted, they warn us of impending scarcity, and stimulate effort to find satisfactory substitutes. Rising prices for cotton or wheat when the crop has been reduced by unfavorable weather conditions are also necessary, although disagreeable. They cannot stimulate production, for the crop year is already ended, and anyway, weather conditions are largely beyond human control. But they do serve to conserve the supply, and apportion it among the most urgent uses.

#### SUMMARY

In the hypothetical "stationary state" so often assumed by economists of a former generation, price stability would mean stationary or unchanging prices. If money and credit were so wisely controlled as to prevent changes

in the price level, if no changes were made in methods of production to increase or lower costs of production, and if wants of men remained unchanged from year to year, then unchanging commodity prices would be both possible and desirable. But in a dynamic world where none of these things is true, stability must be less strictly interpreted. Most of the efforts to "stabilize" prices have originated with producers, but the results are socially desirable only if the interests of both producers and consumers are protected. During normal times, the price level changes quite gradually, and extensive variations in cost of production are unusual. In the absence of monopoly, therefore, unchanging commodity prices indicate that production and consumption have been brought into harmony with each other. When the adjustment can be made without discharging workers, reducing wages, shutting down the plant or sacrificing profits, unchanging prices are socially desirable, but if they are secured by resort to these practices, they result in more evils than do fluctuations in price.

To summarize, the "stability" of prices that is socially desirable is not a rigid fixity of prices, but a flexible system under which sudden changes in price are prevented by accurate, far-sighted knowledge of demand and control over production in accordance with demand. The aim in "stabilization" is not to prevent all changes, but to prevent the evils of fluctuations. There must be enough flexibility to allow for variations in the price level, changes in cost of production and shifts in demand.



# The Causes and Extent of Price Fluctuations

By CHARLES P. WHITE, PH.D.

University of Pennsylvania

**D**URING the month of January, 1928, the price of eggs in the New York market fluctuated between a low of 38 cents and a high of 52 cents per dozen, a variation of 40 per cent. Beef and cotton showed variations of 12 per cent each, pork 11 per cent, butter 10 per cent, rubber 9 per cent, and corn, lard and tin 6 per cent each. Out of 25 representative commodities listed in the *New York Times*, only 4 showed no change in price for the month, these being lead, steel billets, gasoline, and crude oil. The median variation for the group was 4 per cent. On highly organized produce exchanges such as the Chicago Board of Trade, and the New York Cotton Exchange, fluctuations of 3 per cent to 5 per cent in daily closing prices are not uncommon. In contrast with such high variable prices, we find articles like rayon, the price of which has remained unchanged for months and even years.

Why do prices fluctuate so widely, and why is there such a wide variation between the different commodities? The cause is found in the lack of coördination between production and consumption. For some articles, particularly the cheaper, more staple foods, demand is quite uniform. Consumption is regular because of the recurrent physical need for nourishment. The rigidity of food requirements, based as they are on physical needs, prevents any sudden increase or decrease in demand. Such price changes as occur, therefore, are traceable to variations in production, and these in turn are largely due to factors beyond the control of the individual producer. The most important single

influence is weather, which affects not only month-to-month and yearly prices, but day-to-day prices as well. A few warm days, following frequent rains, may flood the market with strawberries and send prices hurtling down, or freezing weather may force egg prices skyward because shipments from the country have practically ceased. If the commodity is durable and can be stored effectively, both the extent and frequency of price changes may be reduced; if perishable, prices will frequently swing within wide limits.

## VARIATION IN CROP YIELD

Month-to-month or yearly prices are also greatly affected by weather, which exerts its influence both on acreage and yield. The acreage of corn or of wheat, for example, may be reduced because plowing and planting are interfered with either by too much or too little rain. With winter wheat, a rigorous winter of freezing weather and little snow may cause huge amounts of ground to be abandoned and planted to other crops in the spring; in the last decade 1.1 per cent to 28.9 per cent of planted acreage has been so abandoned.<sup>1</sup> The most important influence, however, is exerted on the yield per acre. In the period 1909-1924 the yield of corn varied from 23.1 to 31.5 bushels per acre, wheat varied from 12.2 to 17.0 per acre, oats from 23.7 to 37.8, barley from 20.9 to 32.0, and by far the greater part of the variation was due to climatic causes. In the case of corn, the loss in yield due to climatic causes

<sup>1</sup> "Industrial Prosperity and the Farmer," R. C. Engberg, p. 43.



alone has varied from 11.3 per cent to 35.4 per cent of the full yield per acre; for wheat the loss has been 13 per cent to 14.4 per cent; oats, 12.9 per cent to 35.4 per cent; and for barley, 8.0 per cent to 40.7 per cent.

Plant diseases and insect pests also cause considerable variation in crop yield, and like weather conditions, they are not subject to very much control by individual producers. The outstanding example in recent years is the boll weevil, which at one time seemed to threaten the very existence of the American cotton industry, for "in 1921 it was credited with destroying around 3,500,000 bales of cotton, or 31 per cent of a full yield."<sup>2</sup> Another case is that of stem rust which caused a loss of about 180 million bushels of hard red spring wheat in 1916, and in 1918, only about one million bushels.<sup>3</sup>

In addition to these physical factors which prevent a ready adjustment of production to consumption, there are numerous economic forces which must be taken into consideration. For one thing, the effect of production or non-production by any one farmer is relatively slight, since his share of total production is so small. When the price of a certain agricultural product rises, more land may be devoted to the production of that commodity, but when the price falls, there is not necessarily a decrease in acreage. Complete withdrawal from production would result in an enormous loss, since it means scrapping the investment of both skill and capital, and a costly transfer to some other line of endeavor. The gain to be derived by partial withdrawal or by simply reducing output is also quite limited, since such a large share of agricultural

expenses are in the nature of overhead, and continue regardless of the volume of output. Neither is there much opportunity for shifting from one crop to another when price becomes unsatisfactory. The additional cost involved in acquiring new machinery and facilities, the limitation of soil and climate, obstacles in the way of marketing, the fact that much time must elapse before the change brings results, as in setting out an orchard, building up a dairy herd, or in seeding down sod land which was plowed up to raise grain, all of these tend toward continuance of existing output in spite of unsatisfactory prices.

When we turn from the agricultural to manufacturing industry, the situation is reversed. For those industries engaged in manufacturing or processing food products the same thing holds true with respect to demand; consumption is regular because physical needs are recurrent, and uniform, since capacity for food is subject to little expansion. But on the production side there is no comparison. Instead of millions of independent producers each pouring his little dribble of production into the national stream we find at most a few hundred producers, and often the bulk of the output is controlled by a few concerns. The pressure of overhead costs, and the cost of shifting from one line to another may be as great as in agriculture, but there is a tremendous advantage in the fact that stoppage of production by any one concern is likely to have an immediate effect on price. The small number of producers involved makes it much more possible to limit production by coöperative action.

#### VARIATIONS IN DEMAND

In one way, however, most manufacturing industries are at a disadvantage as compared with agriculture,

<sup>2</sup> "Industrial Prosperity and the Farmer," R. C. Engberg, p. 40.

<sup>3</sup> *Ibid.*, pp. 39-40.

and that is with respect to constancy of demand. The demand for food products, we have seen, is uniform and regular. Some other commodities, which cater to rather personal needs, are characterized by the same type of demand, but the numbers are relatively few. Clothing and shelter, for example, satisfy fundamental needs, but demand for them is not as uniform and regular as for food because of their durable nature, and because of the wider range between minimum and maximum requirements. During periods of scarcity and high prices, or when earning power is low, expenditures for clothing may be postponed for a considerable length of time, and when finally made they may be kept at a very low figure by purchasing materials of lower quality or in smaller quantity. For commodities usually known as comforts or luxuries, and less connected with personal needs, demand is even more uncertain. If the article is not considered essential, or if its use is not a matter of habit, consumption will be greatly reduced when incomes are decreased or when prices rise.

There is even more uncertainty in the demand for producers' goods, or commodities used in the indirect satisfaction of wants. Extreme cases are found in the iron and steel industry, or the machine tool industry. Here there is no question of meeting an immediate physical personal need; variations in demand are due not merely to variations in the demand for final consumers' goods or services, to be produced by use of such materials, but to producers' long-run estimate as to what these variations in final consumer demand will be. The length of time that must elapse before the final goods are produced, the chances for mistakes in estimating demand, and the traits of psychology that result in alternate periods of optimism and

depression, lead to wide variations in demand for such goods. To provide for such periods of alternating demand, both the iron and steel and the machine tool industry, maintain productive capacity greatly in excess of average or normal requirements. Production is adjusted to demand, and the price fluctuations that do exist arise out of variations in consumption or demand rather than variations in production.

It is difficult if not impossible to determine whether fluctuations in price of any commodity are due to variations in supply or to variations in demand. In his book on "The Behavior of Prices," Doctor F. C. Mills gives two examples of his investigation of this subject in which he found that in the case of hay 53 per cent of the yearly variability in price for the period 1890 to 1913 was due to variation in production, while with potatoes 88 per cent of the variability was due to this cause.<sup>4</sup> Similar studies for other commodities would be of great help in attempting to stabilize prices, but fortunately such a degree of accuracy is not essential for practical results. The important thing is to know to what extent prices do fluctuate; the reasons can often be discovered without the use of elaborate statistical devices.

Those who desire to prevent price fluctuations want to know not only how frequently prices change, but also how much. Sometimes it is sufficient to know merely that the average price of coal this year is 10 per cent higher than it was last, or that corn is 5 per cent lower. Such a comparison, however, tends to conceal both the number and extent of changes within the year. It is possible, for example, that the average price of steel this year may be 10 per cent higher than last, and it may have remained at this figure practically

<sup>4</sup> Pp. 147 and 149.

all year, while the price of hogs also may average 10 per cent higher, but there may have been wide changes every month, sometimes 30 per cent above, or an equal amount below last year's price. In order to show more accurately what happens, we may find the average deviation of monthly prices from the monthly average for the year, then express this deviation as a percentage of the monthly price. A percentage of 4.2 for pig iron in 1909, for example, would mean that, on the average, pig iron prices each month varied 4.2 per cent from the average price for the year. Such a method permits ready comparison between the degree of fluctuation of various commodities. If we want to study variations over an entire period, say a ten-year period, we may average the yearly percentages, find the average deviation from the average, and express it as a percentage of the average.

In the study previously referred to, these methods have been used by F. C. Mills and measures of variation have been computed for a large number of commodities. The investigation covers the entire period 1890-1925, but this has been broken up into sub-periods of homogeneous economic conditions, and measures of variation computed for each. The prices used are those of the United States Bureau of Labor Statistics. In presenting its figures, the Bureau of Labor Statistics arranges commodities in groups, such as farm products, food, fuel, and lighting, etc. By using Professor Mills's results, therefore, it is possible to make comparisons not only between various commodities but between groups of commodities and for different periods. Such comparisons should throw considerable light on the causes of unstable prices and point out some of the obstacles to the various plans for stabilization.

#### VARIATIONS BY GROUPS OF COMMODITIES

Because of the abnormal conditions which prevailed during 1914-1921, this period is excluded from the present comparison. For the rest of the period 1890-1925, we find that by far the greatest amount of fluctuation is shown by farm products, with foods also showing considerable variation. Much more stable than these is the fuel and lighting group, then bunched very closely come three groups—metals and metal products, chemicals and drugs, and building materials. The cloths and clothing group, made up of some thirty-seven commodities, shows very little variation, while in house furnishing goods fluctuation is insignificant. The table on the opposite page, adapted from Mills's study, shows the facts for the various groups.

Considering individual commodities, rather than groups, we find that the articles showing the least fluctuations are in the metals and metal products and the cloths and clothing groups. The articles which have been the most stable in price over the period 1890-1925 (excluding 1914-1921) are in order named:

Trowels	Planes
Saws	Matches
Underwear	Hammers
Bread	Wilton carpets
Teacups and saucers	Alum
Plates	Shovels
Men's shoes	Brussels carpets
Linen shoe thread	

Those that have fluctuated the most during the same period, which are almost exclusively in the farm products and foods groups, are as follows:

Onions	Apples	Mackerel
Potatoes	Butter	Currants
Eggs	Oats	Rye
Hops	Corn	Hides
Barley	Mutton	Tar
Coke	Turpentine	Cotton
Milk	Cheese	Pig iron
Sheep	Prunes	

MONTHLY VARIABILITY OF COMMODITY PRICES AT WHOLESALE BY GROUPS, FOR 1890-1925,  
EXCLUDING 1914-1921\*

Group	Number of Com- modities	Measures of Variability		
		Low	High	Median
Farm products.....	24	3.7	28.4	8.7
Foods.....	39	.3	11.4	6.3
Cloths and clothing.....	37	.1	5.7	2.7
Fuel and lighting.....	12	.7	13.9	3.7
Metals and metal products.....	34	.0	8.1	4.1
Building materials.....	21	1.5	8.9	3.4
Chemicals and drugs.....	11	.9	7.8	3.5
House furnishings.....	15	.5	4.3	1.1
Miscellaneous.....	13	.5	8.3	3.0

\* Based on Table IV, p. 480, of Mills's "The Behavior of Prices."

The range in the degree of stability of the various commodities is very great. In the list of commodities which show the least variation only those are included whose measure of variability is less than 1.00, while the second group includes those whose variability is 8.00 or above. Many, of course, are much higher than this, onions being 28.4, potatoes 26.4, eggs 23.1, milk 12.6, etc.

## VARIABILITY BY PERIODS

Of special interest to the present discussion are the findings for the various periods. Were prices becoming more stable before the war, and what has been the trend since the war? Measures of monthly variability were computed for 206 commodities, and of these "the prices of 78 were marked by increasing variability during the years from 1890 to 1913, 9 showed no change in the matter of price variability, and the prices of 119 became less variable. The general tendency was in the direction of declining variability."<sup>5</sup>

Since the war, or during the period 1922-1925, there has been a tendency toward more fluctuations. "Of the

<sup>5</sup> Mills, *op. cit.*, p. 46.

total number of commodities studied, the prices of approximately two-thirds were more variable during the years 1922-1925 than they were during the eight pre-war years. The influence of the war-time disturbances upon individual prices has persisted, apparently, and . . . has left us with more variable prices than we had during the years immediately preceding the war."<sup>6</sup>

In some industries, year-to-year fluctuations are more important than month-to-month, since they indicate the more continuous or long-time lack of coördination between production and consumption. Doctor Mills has measured this form of variability by constructing link relatives of average annual prices and finding the mean deviation from the mean of these link relatives. The results are not radically different from those obtained for monthly variability; those commodities which show a high month-to-month variability also rank high in the year-to-year fluctuations. This may be observed in the following list, which is composed of the 23 commodities showing the highest year-to-year variability. By comparing it with the table already

<sup>6</sup> *Ibid.*, p. 46.



given we find that 11 commodities appear in both lists.

COMMODITIES SHOWING THE GREATEST YEAR-TO-YEAR VARIABILITY FOR THE PERIOD 1890-1913<sup>7</sup>

Potatoes	Flaxseed	Pork
Onions	Woodscrews	Cottonseed Oil
Hops	Barley	Rubber
Apples	Coffee	Raisins
Coke	Linseed oil	Mackerel
Currants	Pig iron	Steel billets
Oats	Opium	Lard
Petroleum	Cotton	

The same is true for articles which are more stable in price; those that fluctuate little month by month also show little variation from year to year. Of the fifteen commodities listed below as least variable from year to year, twelve appeared also among the fifteen most stable month by month.

COMMODITIES SHOWING THE LEAST YEAR-TO-YEAR VARIABILITY FOR THE PERIOD 1890-1913<sup>8</sup>

Towels	Underwear
Saws	Matches
Linen shoe thread	Teacups and saucers
Men's shoes	Carvers
Smoking tobacco	Plates
Bread	Hammers
Alum	Cotton thread
Grain alcohol	

### FREQUENCY OF PRICE FLUCTUATIONS

Some articles are constantly changing in price, while others remain stationary over long periods. Outstanding examples of the latter are bread, salt, matches, and rayon which often sell at the same price for months or even years at a time. For other commodities, such as steel rails, bituminous coal, paper, or leather, changes are more frequent, but stationary prices for a month or two are not uncommon. In other lines, particularly vegetables and fruits, price changes occur daily, while on the highly organized produce exchanges, fluctuations have been measured by ten-minute periods. Any program looking

toward stabilization of price must consider the degree of frequency of price change that is harmful and concentrate attention on some period of definite length in the hope of reducing the frequency of change within this period. Whether fluctuations are frequent enough to be harmful will depend very largely on conditions of supply in the industry, the length of the manufacturing process, the possibility of diverting materials and partly finished goods to other uses, the ratio of overhead to operating expense, the ratio of fixed to circulating capital, the merchandising policy (manufacturing to order or for stock), etc. To discuss these conditions in detail for any industry for the purpose of finding how frequent fluctuations must be to be harmful, would carry us too far afield. The frequency of monthly changes in price, however, should throw some light on the subject.

In describing his index of the frequency of monthly price changes, Mills says,

If the price of a commodity were quoted for 240 months, and if in 239 of these months price changes were recorded the index of frequency of price change would be given by the ratio of 239/239, or 1.00. . . . The maximum value of the ratio is, therefore, unity. A value of zero means, of course, that there have been no price changes during the period covered.<sup>9</sup>

The results of this method are very similar to those obtained in measuring the variability of prices. Farm products show the greatest frequency of change, 16 of the 24 commodities listed in this group showing price changes in 98 per cent or more of the months during the period 1890-1925 (omitting the years 1914-1921). In foods, 9 of the 39 articles showed changes in 98 per cent of the months. The next highest groups, but con-

<sup>7</sup> Adapted from Mills, *op. cit.*, pp. 497-501.

<sup>8</sup> *Ibid.*

<sup>9</sup> Mills, *op. cit.*, p. 57.



siderably more stable than either foods or farm products, are fuel and lighting, and metals and metal products. Both building materials and chemicals and drugs are relatively stable, with the exception of one or two commodities in each group. By far the lowest rate of change is in the house-furnishings group, none of the 15 articles showing a change in more than 31 per cent of the months, and only 2 in more than 10 per cent.

With regard to trend, it was found that the frequency of fluctuation is greater since the war. In the pre-war period 1890-1913 there was a slight tendency toward less frequent changes, for of the 206 articles studied, 95 showed a decline in the frequency of change, 92 showed an increase, and 19 showed no change. When the post-war years 1922-1925 are compared with 1890-1913, fluctuations appear more frequent—137 commodities showing an increased frequency, 43 a decline, and 26 no change.

#### CYCLICAL FLUCTUATIONS

Lack of coördination between production and consumption is particularly in evidence during extreme cyclical movements. If production can be expanded rapidly when demand increases during the boom period, price increases are greatly retarded, just as the decline in prices can be checked during the liquidation or depression stage if production can be curtailed readily. Ease of expanding or curtailing production varies greatly from industry to industry, and we should expect, therefore, to find that prices of some commodities rise very high and sink quite low when the cycle runs its course, while prices of other articles are little affected. To measure the sensitiveness of various prices to cyclical influences, Mills has devised an "index of cyclical variability," which

is the average percentage change from low to high, and from high to low, prices during the cycle. This index has been computed for over 200 commodities for the ten cyclical periods during 1890-1925. A number of commodities, mainly from products, have been dropped because they showed little conformity to the more regular cyclical movements. Of the remainder, the ten showing the greatest, and the ten showing the least cyclical variability are listed below.

Greatest Cyclical Variability, 1890-1925		Least Cyclical Variability, 1890-1925	
Coke.....	58.2	Alcohol.....	12.8
Sheep.....	50.7	Anthracite.....	12.9
Mutton.....	47.7	Shovels.....	12.9
Petroleum.....	45.0	Lead: carbonate of	14.9
Cotton.....	44.7	Zinc: oxide of.....	15.1
Turpentine.....	44.3	Flannels: white.....	15.3
Lard.....	42.9	Pine: white.....	15.4
Prunes.....	42.8	Men's shoes.....	15.7
Print cloths.....	42.7	Trowels.....	16.3
Raisins.....	42.7	Pine: yellow.....	17.5

The great difference between the two groups is accounted for in part by the difference in the ease or difficulty in expanding or curtailing output, and in part by the nature of demand for the various commodities, since some commodities are little affected by cyclical influences.

This brief survey of the causes and extent of price fluctuations indicates some of the complications that confront those who desire to stabilize prices. It has been shown that in most lines changing prices are the normal thing, since they reflect changes in production or consumption, but that both frequency and extent of the fluctuations vary greatly among groups and also among individual commodities within each group. Stabilization, therefore, involves some degree of control over either production or consumption. Of these, control over production is the most feasible, not only because it is within the power of the producer

himself, but also because production is more concentrated and requires the coöperation of fewer numbers. Such control reaches its highest expression in the form of monopoly, but because of the economic and legal obstacles, complete monopoly is seldom found. In its place there has sometimes been substituted a loose form of coöperative activity which aims to control production not by edict, nor even by agreement, but by the voluntary action of individual producers who believe that the interest of the group is of more importance than that of the individual, or that the individual serves his own interest in the long run by first serving the interest of the group. To permit him to know what the interest of the group requires at various times, it is necessary to have information on production, sales, inquiries, stocks on hand, etc. How often this information will be collected will be determined by how closely it is desired to control prices. In very few cases will it be desired to prevent fluctuations from day to day, for in most businesses, either the month-to-month or yearly changes are of more significance.

In some lines this coöperative policy offers little opportunity for stabilizing prices. This is notably true in agri-

culture, because of the difficulty of getting uniformity of action on the part of such a large number of producers, and also because production is not within complete control of the producer due to weather influences. Some idea of the force of this influence may be gained by studying the tables in this chapter which show how agricultural commodities predominate in the lists showing frequency of price changes or month-to-month and year-to-year variability.

The opportunity of reducing fluctuations in other lines is also indicated by the tables. If variability in the past can be taken as a guide, the most promising field is, as might be expected, among the staples, and particularly producers', rather than consumers' goods. The real possibilities, however, can be determined only after a painstaking study covering the conditions under which the article is produced, such as the extent of monopoly, the prevalence of overhead costs, etc., and on the consumption side, the extent of style connected with the product, whether industrial or consumers' goods, etc. Undoubtedly much can be done within the law to bring production more in line with consumption and thus reduce price fluctuations.

# Industrial Changes Due to Chemistry

By EDWARD R. WEIDLEIN

Director, Mellon Institute of Industrial Research, Pittsburgh, Pa.; President, American Institute of Chemical Engineers

## EDITOR'S NOTE

Two influences that are continually upsetting "normal" price relationships are inventions and chemical discoveries. Historians still speak in awed tones of the changes brought about by the Industrial Revolution of the eighteenth century. Future students will probably point out that developments of the early twentieth century are of even greater significance. The development of the truck and the aeroplane have revolutionized railroad rates. Discovery of coal-tar dyes threatened the prosperity of a million-acre indigo industry in India, and an even greater upheaval will result if synthetic rubber becomes commercially profitable. In 1926 nitrate producers of Chile petitioned for a lower export tax to meet competition from air-fixed nitrates, and the Japanese camphor monopoly twice cut its prices because of synthetic camphor made in France and Germany. Rayon, made from wood or vegetable fiber, has stimulated the demand for the natural textiles, in some lines, because it is used in conjunction with them; but in others, it threatens to replace not only wool and cotton, but silk as well. Without artificial leather the automobile industry would have been tremendously handicapped in providing tops and seat covers, and the discovery of synthetic lacquer and varnish has meant tremendous savings in both time and money.

Any program designed to stabilize either industry or prices must take into consideration both chemical discoveries and inventions, for they not only benefit the consumer by lowering prices, but also threaten the existence of established industries. It has not been possible to secure an article dealing with inventions, but the following paper by Dr. Weidlein provides a comprehensive picture of the changes that have taken place in industry as a result of chemical discoveries.—EDITOR.

THE United States heads the countries of the world in material property and in the production of wealth. Especially since the World War, there has been a relatively smooth flow in immense volume of goods for the satisfaction of innumerable wants.

The causes of this prosperity have been given much discussion. All students of the subject agree, however, that the production of wealth has increased more rapidly than the population. There is, therefore, more wealth per inhabitant than before. As a reason for this increase is advanced the view that more machinery is being used today in production; human labor is being supplanted by mechanical devices. While it is certainly true that more machinery and more power are at the service of the American people than ever before, the essentially fundamental part played by scientific research in enhancing national wealth and welfare cannot be overlooked.

Scientific investigation on behalf of manufacturing (industrial research) is the guiding hand of the modern manager. It has brought him his methods as well as much of his mechanical equipment.

Technology and science have their meeting-point in industrial research, wherein the languages of chemistry, physics and biology, the industrially basic sciences, are translated to the manufacturing world.<sup>1</sup> The essence of industrial research is invention; the most important object, the application to industry of scientific fact.

Technology has a vast domain, including all the forms of industry, physical or chemical (embracing biochemical) or a combination of both. The manufacture of leather or the production of pig iron is a chemical operation, while the making of a shoe

<sup>1</sup>The writer has dealt with the technologic position of science from other angles in *The Pittsburgh Record*, 2 (1928), 275.

or the rolling of a rail is a physical process. In most technologic branches, however, the products are the results of chemical action, and then, too, the practical success of the operations is dependent upon the choice of materials used in the construction of the plant as well as upon its correct arrangement from an engineering standpoint. The industrial chemistry of today has been developed along physical or engineering lines, and hence industrial research is largely physicochemical in nature. Chemical engineering, the directional force of much of technology, is in inward nature applied physical chemistry.

Chemistry, the eldest of the experimental sciences, made research, but it remained for economics to show the need for and value of industrial research. As early as 1890, the opinion was expressed in England and on the continent by chemists who sensed the trend of developments in their science, that the greatest advance in future years would take place in America. Although European countries stood in the forefront at that time, it was felt that conditions were such in America that we were destined to take the lead in a not distant date in both industrial and scientific achievements. This prophecy has to a large extent been fulfilled. For many years the German chemical manufacturer was far in advance of those of all other nations in recognizing the utility of industrial research; but during the past decade American technologists have assumed leadership in employing highly trained chemists and other scientists in original researches with a view to new discoveries or to useful improvements. The United States now has the largest chemical industry in the world, with a production valued at more than \$2,275,000,000, and this position has been attained through coöperation be-

tween aggressive capital and creative science (see Table I).

Among the topics of technology that have been especially enriched through research is metallurgy. In early times metallurgy was chemistry, as now metallurgy has become chemistry. Fuels, particularly coke, manufactured gas and petroleum, and ceramics, including glass, clay products, refractories and cements, also relate to chemical substances that have been given extended research by specialists, through which have come great improvements in the quality and cheapness of the old products as well as many new products. But the inorganic and organic chemical manufactures, food production, textile technology, and the leather and paper industries have been even more notably benefited by chemical research.

In this article an effort will be made to show clearly the high utility of chemistry in industry.<sup>2</sup> Since it is thought by the writer that chemistry is one of the foundation stones on which national progress rests, the evolution of chemico-industrial research in the United States will first be described, and then an attempt will be made to indicate the changes of economic importance that chemistry has wrought in a number of essential industries.

#### THE INITIAL STAGE OF TECHNO-CHEMICAL RESEARCH IN AMERICA

The first manufactures in colonial America—pot or soap ashes in 1608, glass in 1610 and leather in 1620, all in Virginia—were chemical in nature. But American chemical technology actually had its beginning in the pioneer work of John Winthrop, Jr.,

<sup>2</sup> The writer has discussed other aspects of the national importance of chemical research in *Proceedings of the Institute of Management*, 1928, No. 6. Reprints of this paper will be sent gratis to all interested persons who request them.

TABLE I.—TOTAL CHEMICAL PRODUCTION, IMPORTS, AND EXPORTS IN 1899, 1914, AND 1927\*  
(In millions of dollars)

Chemicals	Production			Exports			Imports		
	1899	1914	1925	1899	1913	1927	1899	1913	1927
Naval stores, paints and varnishes.....	90	168	528	12	34	56	7	12	30
Rosin and turpentine.....	20	21	46	10	26	34	...	...	...
Pigments, paints, varnishes.....	70	147	482	2	8	21	1	2	4
Coal-tar products.....	1	13	112	...	0.1	17	5	15	24
Dyes and other finished....	...	...	62	...	...	5.5	4.5	10	6.5
Crude drugs, essential oils, waxes.....	59	114	307	2	4	7	8.5	14	36
Essential oils.....	0.7	2	6	0.2	0.7	2	2	5	6
Explosives, pyroxylin, matches.....	25	63	132	0.5	4	5	0.5	2	5
Explosives.....	17	41	70	0.2	3	2.5	...	0.5	0.1
Matches.....	6	13	24	0.1	0.1	0.1	0.1	0.7	2.2
Fertilizers.....	53	176	235	7	12	18	6	43	63
Industrial chemicals.....	55	177	491	8	16	50	20	31	29
Medicinal and toilet preparations.....	89	167	473	3	9	29	1	7	12
Prepared medicines†.....	59	102	175	2.7	7	18	0.9	5	5
Toilet preparations.....	7	17	150	0.3	2	9	0.5	2	7
Total.....	372	878	2278	32.5	79.1	182	48	124	199

\* Sources: production, Bureau of the Census; exports and imports, Commerce and Navigations of the United States, Bureau of Foreign and Domestic Commerce; A. H. Swift, *Industrial and Engineering Chemistry*, 20 (1928), 658.

† "Prepared medicines" also includes such compounds as insecticides, fire-extinguishing compounds, deodorants, and similar preparations in 1899 and in 1914 but not in 1925.

who landed in Boston in 1631, at the age of 25. He became interested in the production of alum, copper, glass, iron, potash, salt, saltpeter, tar, and other needed commodities; and he and his uncle, Emanuel Downing, carried out experiments on the preparation of indigo that entitle them to the honor of having conducted the first industrial research within the present borders of the United States. In 1662, Winthrop read a paper on making tar before the Royal Society of London.

The earliest organized effort to encourage scientific investigation on behalf of American industry is reported in the preface of the first volume of the *Transactions of the American Philo-*

*sophical Society*, published in 1789, in which the aims of the Society were presented. Among these were "making useful discoveries that would . . . promote the interest of the country." What was evidently one of the first contributions to chemistry from this country, bearing the date September 10, 1768, appears in the *Transactions* of this Society under the title "An Analysis of the Chalybeate Waters of Bristol in Pennsylvania," by John de Normandie.

In his first annual address, in 1790, President Washington said:

The advancement of . . . manufactures by all proper means will not, I trust, need recommendation; but I cannot forbear



intimating to you the expediency of giving effectual encouragement as well to the introduction of new and useful inventions from abroad as to the exertions of skill and genius in producing them at home. . . . There is nothing which can better deserve your patronage than the promotion of science.

In subsequent messages to the American people, he gave concurrence to the growing sentiment that the substantial support of science would contribute to the security of the nation. It is related that Washington endeavored to induce Chaptal, the distinguished French chemist, to emigrate to this country. But Chaptal, who was zealous in developing French industries, elected to remain at home.

A book that appeared in 1790—John Penington's *Chemical and Economical Essays*—was intended to illustrate "the connection between the theory and practice of chemistry and the application of that science to some of the arts and manufactures of the United States." On the title page Penington placed this quotation: "It is a pity so few chemists are dyers, and so few dyers chemists." This work was the first American effort to popularize chemistry.

In 1792 there was founded in Philadelphia the first chemical society in the world. Its main object was to collect definite information relating to the minerals of the United States. A standing committee of five chemists was charged with the duty of analyzing any mineral which might be submitted to it, provided it was forwarded free of expense, with an account of the locality and situation in which it was found. The analyses were made without charge. In 1799 this society also gathered information relating to the manufacture of niter, acquainted the public with the uses of various minerals, and encouraged the manufacture

of pottery. Evidence of the interest which was evinced at this time in ceramics, may be found in an oration delivered by Felix Pascalis before the Chemical Society of Philadelphia in 1801. This savant said:

Encourage and repeat mineralogical experiments on all kinds of alumine. The first who will successfully procure manufactured works of the kind and tolerably good earthen wares will deserve well of his country and be rewarded by the gifts of fortune.

For years about 1800 Adam Seybert, of Philadelphia, was the leader in the domain of mineral chemistry in this country.

In 1799 the American Mineralogical Society solicited the citizens of the United States to communicate on all mineralogical subjects, "but especially on the following: (1) concerning stones suitable for gun flints; (2) concerning native brimstone or sulphur; (3) concerning salt-petre; (4) concerning mines and ores of lead."<sup>3</sup> This Society, which had its headquarters in New York, did much to foster the serious study of raw materials of mineral technology.

Among the American chemists of this period who became interested in manufacturing processes was James Woodhouse, professor of chemistry in the medical department of the University of Pennsylvania from 1795 to 1809.<sup>4</sup> He was the first to demonstrate the superiority of anthracite over bituminous coal "for intensity and regularity of heating power." Contemporaneous with Woodhouse were the following chemists: Robert Hare, the inventor of the oxyhydrogen blowpipe

<sup>3</sup> *Medical Repository*, 2, 114.

<sup>4</sup> Woodhouse and also Seybert received their chemical instruction from Benjamin Rush, the holder of the first chair of chemistry established in America, at the University of Pennsylvania, in 1769.



(1802), who obtained calcium carbide, phosphorus, graphite and calcium by the aid of electricity, and is to be regarded as the earliest experimenter in electrochemistry; Joseph Cloud, assay master at the Philadelphia Mint, who, in 1807, made an interesting research—perhaps the first in metallurgy in this country—on a native alloy of palladium and gold from Brazil; John Harrison, the first manufacturer of sulfuric acid in this country (1793), who was an ingenious industrialist and made a number of technical innovations in practise; and Gerard Troost, professor of chemistry at the University of Nashville, who founded an alum factory at Cape Sable, Md., in 1814.

#### THE AWAKENING OF CHEMICAL TECHNOLOGY

American chemical technology received developmental stimuli from the embargo of 1806 and the war of 1812. These effects are clearly seen in the general character of the patents issued to chemical inventors. Previous to 1806, these patents related chiefly to the old colonial industries of distilling, salt manufacture, potash making, and the utilization of sperm oil and other fats for soap and candles.<sup>5</sup> But after 1806, when the importation of foreign goods was restricted, the inventive genius of American chemists began to be diverted into more modern channels. Between 1806 and 1814 there are noted for the first time inventions that relate to subliming sulfur, dyeing silks and calicoes, bleaching, refining camphor, waterproofing leather, making artificial mineral water, and manufacturing sulfuric acid, copper acetate, magnesia, and white and red lead. The year 1806 marks the real awakening of industrial chemistry in the United States. The first Americans to go abroad for

chemical training, Benjamin Silliman, John Gorham, and others, were returning from their studies in Europe and contributed their share to the new movement. American publishers began also about this period to print practical treatises upon chemistry—works of native writers such as Thomas Ewell, James Cutbush, Franklin Bache, and John Gorham, and reprints of European authors such as Jane Marcet, Joseph Black, Samuel Parkes, Thomas Thomson, and Fredrick Accum—and for the first time the attention of the public was called forcibly to the national importance of chemical industries.

The importance of chemistry in agriculture was given considerable thought at this time by members of the Philadelphia Society for Promoting Agriculture. Apparently they recognized the possible application of chemical knowledge to the maintenance of soil fertility. In this Society's *Memoirs* for 1811 were articles on the employment of gypsum, leached ashes, lime, and salt as fertilizers. Two eminent citizens of the young republic, Thomas Jefferson and John Adams, were endorsers of the study of chemistry for useful purposes, especially in producing better crops and foods. Jefferson regarded Silliman's *American Journal of Science* as among "the things of select reading" which he had time to peruse. In a letter to John Gorham of Harvard in 1817 Adams said: "We are all chymists from our cradles. . . . Chymists! pursue your experiments with indefatigable ardour and perseverance." The fathers of our nation were just as practical as the fathers of American chemistry.

The value of chemistry to industry was well known in 1815, when it was pointed out<sup>6</sup> that the science was an important aid to the study of mineralogy, pharmacy, electricity, cooking, met-

<sup>5</sup> C. A. Browne, *Industrial and Engineering Chemistry*, 14 (1922), 1070.

<sup>6</sup> *Analectic Magazine*, 6, 145.

allurgy, and in various manufacturing industries, especially glass, leather, soap, paint, glue, starch, etc. In fact, it would be an easy task to continue almost indefinitely the list of arts whose processes, if they admit of explanation at all, must be explained upon the principles of chemical philosophy.

A little later Benjamin Silliman<sup>7</sup> observed that

the present period is distinguished by wonderful mental activity; it might indeed be denominated as the intellectual age of the world. At no former period has the mind of man been directed at one time to so many and so useful researches.

By 1822 the manufactures of the United States, though depressed immediately after the war with Great Britain, had considerably increased, and were still increasing, under the stimulus given them by the tariff of 1816 and by subsequent laws. About ten years later, President Jackson, in reviewing the satisfactory condition of technology, whose works were being extended with unprecedented rapidity, remarked that "science is steadily penetrating the recesses of nature and disclosing her secrets, while the ingenuity of free minds is subjecting the elements to the power of man and making each new conquest auxiliary to his comfort." Shortly before 1850 the occurrence of gold, silver, copper and mercury in New Mexico and California aroused new interest in mining and metallurgy.

#### CHEMISTRY IN INDUSTRY, 1820-1860

Industrial research was carried on extensively in the United States from 1820 to 1860. James Cutbush, professor of chemistry at West Point, made a number of valuable contributions to scientific pyrotechnics, but is chiefly remembered for his description, published in 1822, of the production of

<sup>7</sup> *American Journal of Science*, 3 (1821), 330.

cyanogen by the action of nitric acid upon charcoal. A prominent industrial chemist, Samuel Guthrie, of Sackett's Harbor, N. Y., discovered chloroform, engaged in the manufacture of fulminating compounds, and devised a commercial process for the rapid conversion of potato starch into sugar (1832). An able metallurgical chemist, W. W. Mather (1804-1859), of Columbus, Ohio, made an elaborate research on the principles involved in the reduction of Mexican silver ores, in 1833. Lewis Feuchtwanger, who was well-known to the chemists of this period by his commercial establishment for the manufacture and sale of "rare" chemicals, devised, in 1837, an expeditious method for the manufacture of vinegar and later, in 1872, studied the process of glass-making. Then there was S. L. Dana, of Lowell, Mass., who was, for fifty years, an acknowledged authority on technical chemistry. After the completion of his medical studies in 1818, Dana soon devoted himself to manufacturing chemistry, holding the position of chemist to the Merrimack Manufacturing Company, Lowell, Mass., from 1833 to 1868; he invented the "American system" of bleaching in 1838, and also gave research attention to dyeing, fertilizers and lead poisoning. His book entitled *Muck Manual*, intended for farmers, discussed soils and manures.

The following were among the other chemists of this period who busied themselves in the domain of industry and inspired hosts of younger men: St. Julien Ravenel (1819-1882), who made experiments upon converting South Carolina phosphate rocks into commercial fertilizers; J. C. Booth, of Philadelphia, Pa., noted for his work on beet-sugar (1842), the production of gelatin (1842), the nickel ores of Pennsylvania (1856), and illuminating oils (1862), as well as for being the

founder of an active firm of chemical consultants; John Dean, of Boston, Mass., who investigated the value of different kinds of prepared vegetable foods in 1844; David Alter, of Freeport, Pa., one of the discoverers of spectroscopy, who began the manufacture of bromine in 1846 and later became a coal-oil technologist; Charles Lennig, an industrialist of Philadelphia, who was the first to manufacture bleaching powder in the United States (1847) and afterwards (1869) introduced the manufacture of hydrochloric acid by modern methods; L. C. Beck, professor of chemistry in Rutgers College, who made valuable observations respecting bleaching and disinfecting compounds and was an authority on breadstuffs (1848); A. C. Twining, a chemical engineer of the fifties, who invented an ice machine; A. A. Hayes, of Brookline, Mass., a student of the Bessemer process (1852); C. M. Wetherill (1825-1871), who conducted researches on illuminating gas in 1854 and on the manufacture of vinegar in 1860, and who was the first chemist of the U. S. Department of Agriculture (1862); Benjamin Silliman, Jr., the author of techno-chemical classics on Pennsylvania petroleum (1855), California petroleum (1865 and 1867), and on the combustion of fuel (1860); E. N. Horsford (1818-1893), a resourceful research chemist, who studied breadmaking and condensed milk manufacture and worked out processes for preparing phosphoric acid (1856), then was active in creating markets for this product; Henry Wurtz, of New York, who played an important part in the development of the manufacture of glycerin in 1858; and J. M. Ordway, of the Massachusetts Institute of Technology, who investigated the manufacture of sodium hydroxide in 1858 and of sodium silicate from 1861 to 1865.

Several other branches of manufac-

ture were improved by the results of scientific studies that eventuated in patents during this period. The following subjects were among the ones investigated: desulfurization of ores, concentration of sulfuric acid, manufacture of sodium carbonate, preparation of ferrocyanides and wood distillation products (rosin, turpentine, etc.), vegetable color extraction, inorganic colors, mordants, tannin extraction, paint pigments, gun and blasting powders, match compositions, and rubber manufacture. In each instance improvements, some of them outstandingly important, were patented in consequence of these industrial researches, many of which were crudely conducted as compared with the practises of today.

#### TECHNO-CHEMICAL RESEARCH, 1860-1880

After 1860 American manufactures increased with wonderful rapidity under the encouragement that they received. They also became more and more diffused, making the interest in them more general. With the improvements in machinery and processes that were effected, imports of many articles fell off largely within a few years.

Joseph Wharton, of Philadelphia, deserves special mention in the history of technology in America. After some preliminary experiments, Wharton erected at Bethlehem, Pa., in the year 1860, a spelter works of sixteen Belgian furnaces, which produced over 3,700,000 pounds of zinc in 1862. The product was of excellent quality, and was made so cheaply as to afford a reliable profit and to plant the zinc industry firmly in the United States. Wharton first reduced silicate of zinc to metal on a large scale, successfully applied anthracite to the manufacture of spelter, and used American clays for making zinc retorts.

Many chemists rendered service to the advancement of industry during the two decades, 1860-1880, and it is difficult to designate the most prominent workers. B. F. Craig, of the laboratory of the Army Medical Museum at Washington, D. C., was engaged in the field of explosives and, during the period 1861-1864, made a number of contributions to our knowledge of gunpowder. Frederick Hoffmann, of New York, was an authority on organic colors and medicinal chemicals. C. A. Goessmann (1827-1910), of the Massachusetts Agricultural College, contributed to the manufacture of salt (1863), the refining of sugar (1864), and the production of beet-sugar (1872). He was the author of 362 papers and reports. F. H. Storer, of Harvard University, made researches on the alloys of copper and zinc in 1864 and on petroleum in 1865.

Charles F. Chandler, of Columbia University, was always productive in research. His early studies of technical importance were those on water for locomotives (1865), the water supply of New York (1868 and 1870), the purification of illuminating gas (1870), kerosene (1871), and the manufacture of condensed milk (1871). Another chemist who was called upon by the gas industry was Henry Wurtz, who made improvements in the methods of purifying water-gas (1867) and, jointly with Silliman (1869), elucidated the processes of manufacture.

The researches of S. F. Peckham on asphalt and petroleum were carried on from 1867 to 1874. W. H. Chandler, who, with C. F. Chandler, edited the *American Chemist*, contributed to the purification of zinc containing iron (1869) and to the refining of iron (1870). J. B. Britton, chemist to the "Iron Masters' Laboratory," performed a great amount of technical work. S. Dana Hayes, state assayer

of Massachusetts, studied the destructive distillation of naphtha in 1871 and was recognized as an authority on petroleum technology. Isidor Walz, of New York, was a textile expert. C. U. Shepard, Jr., of Charleston, N. C., an authority on fertilizers, investigated the effects of sulfur dioxide on vegetation in 1872. Henry Morton, of Stevens Institute, had occasion to conduct a series of researches on petroleum (1872-1874). J. P. Kimball, of Lehigh University, engaged in work in ferrous metallurgy and found uses for emery in the iron industry (1873). R. W. Raymond investigated the calorific value of lignites in 1873. J. F. Babcock, of Boston, Mass., carried out researches which established him as an expert on wood preservation. T. M. Drown, professor of chemistry at Lafayette College, was the author of important papers on the blast furnace, the puddling and Bessemer processes, and the conditions of carbon in gray and white pig iron. H. M. Pierce was most active in the promotion of the interests of the wood-distillation industry. C. E. Avery, of Boston, Mass., laid the foundation for the manufacture of lactic acid. Charles and Nelson Goodyear and A. G. Day are known for their inventions in connection with rubber. R. C. Kedzie (1823-1902) originated the Michigan beet-sugar industry and added to the knowledge of fertilizers.

#### TECHNO-CHEMICAL RESEARCH DURING THE LAST HALF-CENTURY

Sufficient has been presented to show that American chemists have, from the inception of the republic, been constantly engaged, to a greater or less degree, in original investigations of the problems of manufacturing. Time will not permit the recounting of all the valuable contributions which have



TABLE II.—EARLY AMERICAN CHEMICAL INDUSTRIES

Manufacture	First Manufacturer	Year	First Important Improvement	By Whom	Year
Sulfuric acid . . . . .	John Harrison, Philadelphia, Pa.	1793	Platinum still for concentrating	John Harrison	1814
Gunpowder . . . . .	E. I. du Pont de Nemours, Wilmington, Del.	1802	Manufacture of potassium nitrate from sodium nitrate	DuPont Company	1868
White lead . . . . .	S. Wetherill & Son, Philadelphia, Pa.	1804	The use of cheaper material from Mo. and Ill.	—	1850
Pharmaceutical chemicals . . . . .	Rosengarten & Sons, Philadelphia, Pa.	1823	Production of ether and quinine, 1823; morphine, 1832; strychnine, 1834	Rosengarten & Sons	—
Varnish . . . . .	P. B. Smith, New York, N. Y.	1828	Improvement of quality to create a foreign market	P. B. Smith	1836
Wood distillation . . . . .	James Ward, North Adams, Mass.	1830	Manufacture of acetate of lime and wood alcohol	J. A. Emmons and A. S. Saxon	1867
Nitric acid . . . . .	Carter and Scat-tergood, Philadelphia, Pa.	1834	Distillation apparatus	Edward Hart	1898
Hydrochloric acid . . . . .	Carter and Scat-tergood	1834	Manufacture by modern methods	Charles Lennig	1869
Chlorine . . . . .	Charles Lennig, Bridesburg, Pa. (Bleaching powder)	1847	Commercial process for the electrolytic decomposition of sodium chloride	E. A. LeSueur	1893

been made by the chemical profession during the most modern period of our industrial history, from about 1880 to the present time. It will be necessary to limit our consideration to some of the most notable achievements in a few of the important technologic fields.<sup>8</sup>

<sup>8</sup>Other industries have been given attention elsewhere by the writer. In an article published in *Chemical and Metallurgical Engineering* in 1927 (34, No. 4), he has described research feats in the aluminum, carbon products, electrical, explosives, glass, hydrocarbon products, lead, nickel, paint, photographic, rubber, and synthetic resin industries. He has also discussed lacquer, plastic, rubber, and solvent research in *The Pittsburgh Record*, 2 (1928), 270-5. Reprints of these papers are available for gratuitous distribution.

Herbert Spencer once remarked, "It is only by perpetual aspiration after what has been hitherto beyond our reach that advance is made." For many years American scientists, and especially chemists, aspired to the extension and organization of the application of research method in industry. This great ambition, largely fostered during the past decade by such agencies as the American Chemical Society, the National Research Council, and our engineering societies of national scope, received an encouraging impetus about twenty years ago, when Robert Kennedy Duncan put into operation his Industrial Fellowship System, a practical procedure of link-

ing the university laboratory to industry, for attacking the latter's problems, which soon led to successful coöperation and productive effort. These beneficial results promptly stimulated workers in and supporters of existent industrial research establishments; they also showed clearly, to university science teachers, the importance and utility of applied research, and the coming need for capable investigators. During and since the World War the development of industrial research has been remarkably rapid, in the many branches of manufacture that have been or expect to be improved by scientific investigation, as well as in the research training schools. From what has been said, however, it is plain that all progress in industrial chemistry is made by evolution and not by revolution. In the past we have had various successive periods of human activity that have been characterized by the use of stone, bronze, iron, etc. A very appropriate term to apply to the period in which we are now living, and which began with the creation of modern chemistry in 1774, would be "The Chemical Age."

#### NOTABLE RESEARCH ACCOMPLISHMENTS IN METALLURGY

Chemically controlled industry in the United States is relatively modern. In illustration of this fact, we have the record of the attitude of various American industries toward chemistry less than seventy years ago. As late as 1860, J. C. Booth, a chemist mentioned previously, endeavored to induce the iron masters of eastern Pennsylvania to contribute jointly the small annual sum of \$1200 for controlling the work of their furnaces by chemical analyses of the ores. It is related that he was completely unsuccessful in his efforts. There has never been any royal road in industrial research.

Later on, however, iron and steel industrialists began to take an interest in chemistry, largely because Andrew Carnegie, the great iron master and a great business man, found that little furnaces could be run by rule-of-thumb and guess, but not such large furnaces as he decided to equip and operate in Pittsburgh. He employed a chemist to assist the manager of his works, and straightway "Lucy Furnace," an undertaking of magnitude in those days, "became the most profitable branch of our business, because we had almost the entire monopoly of scientific management. It was years after we had taken chemistry to guide us that it was said by the proprietors of some other furnaces that they could not afford to employ a chemist. Had they known the truth then, they would have known that they could not afford to be without one."

The technically important contributions of chemistry to the iron and steel industries began with the introduction of the great pneumatic process of steel-making. The Bessemer process and the Siemens-Martin open-hearth process produced a far-reaching change in the iron industry that afforded the chemist his first real opportunity. Prior to the days of steel, iron-making was largely an empirical art, and no manufacturer considered the estimation or control of the impurities which generally accompany the metallurgy of iron to be a vitally important matter. Of course, it was known through the operation of the puddling and crucible processes that certain elements imparted hardness and toughness, but the very important quantitative rôles in the metallurgy of iron played by carbon, manganese, sulfur, phosphorus, and silicon were not understood. Original chemical researches into the methods for determining and controlling these so-called impurities forced the



essentiality of chemistry upon ferrous metallurgists. Indeed, the iron blast-furnace is but the chemist's crucible on a gigantic scale, operated on chemical principles; and the application of chemistry to iron smelting has effected such wonderful transformations that today the chemist occupies the foreground in directing the operations in the industry. Not only has inorganic chemistry in its analytical and physical branches played a highly important part in the steel industry, but organic chemistry has also entered the field in the by-product coking of coal. Thermochemistry, electrochemistry, and metallography are the divisions of physical chemistry which have been most active in promoting the scientific development of the metallurgy of steel. Ceramics has also been of essential aid in providing information respecting refractories.

It is difficult to recall a more far-reaching invention than that of the dry air-blast for the manufacture of iron, devised by James Gayley, a metallurgical chemist. This discovery effected a reduction of from \$0.50 to \$1.00 per ton in the cost of producing pig iron, besides making it possible for the iron-master to produce, in all weathers, a metal of uniform quality. The dry air-blast was developed by Gayley between 1885 and 1904 at the Edgar Thomson and Isabella furnaces in Pittsburgh.

#### OTHER ACHIEVEMENTS IN METALLURGY

The growth of the manufacture and uses of alloy steels has been phenomenal. These special steels contain, besides iron and carbon, the element or elements capable of altering the physical characteristics of the iron or of increasing or otherwise influencing the effect of the carbon present. High-speed tool steels contain large

percentages of tungsten, chromium and vanadium. One of the earliest alloy steels, Hadfield's manganese steel, contained from 12 to 14 per cent manganese. Later nickel steels of the "Invar" type containing from 35 to 40 per cent nickel were developed and today the exploitation of high-chromium steels of the "rustless" or "stainless" type is being carried on with energy. This last type of steel contains chromium from 8 to 60 per cent, either alone or associated with other alloying elements, such as nickel, silicon, or copper.

Alloy steels have been responsible for important developments in several industries. The efficiency of electrical equipment is based on the use of high-silicon steel, a steel carrying about 4 or 5 per cent of silicon. Besides the use of silicon steel in motors, generators, transformers, etc., all magnetic apparatus is dependent upon steel carrying either tungsten, cobalt or chromium. Resistance heating elements are also dependent upon high percentage alloys of chromium and nickel, which have made possible the extended use of electrical heating.

Alloy steels have played an important part in the generation of power. High-speed turbines with high chrome blades have been developed, and, with the advent of steels possessing great mechanical strength at high temperatures, the problem of the internal combustion turbine will be solved. In the generation of steam power and in superheating steam, boiler material is needed that is similar to the requirements of the oil-cracking and synthetic nitrogen industries, where nickel and especially vanadium are useful. The modern tendency in locomotive construction is toward higher and higher pressures, and boiler plates, stay bolts and rivets will be subjected to higher stresses. Vanadium steels are being

developed especially for this work. Nickel has also been investigated for the purpose.

Another engineering achievement which seems to promise revolutionary results in transportation problems is the application of roller bearings to railroad work. This would not be possible without the use of appropriate alloy steels.<sup>9</sup>

The metallurgical industries have to do with 50 other well-known metals, in addition to iron, as well as with over 1600 alloys. Metallurgy is largely chemical in character—smelting, refining, electroplating, alloying, and heat treatment involve various phases of chemistry—and in all metallurgical advances the chemist has done, is doing, and will do most of the work. This fact is conceded even by the 25 per cent of all metallurgists who did not start as chemists (as did three-fourths of the metallurgical profession) before they entered the field of metallurgy. The Cottrell process for smoke precipitation is a well-known physico-chemical research contribution to applied metallurgy.

The corrosion problem is outstanding in the use of metals. It has been calculated, for example, that the annual wastage of iron and steel through corrosion totals over three billion dollars. Sufficient progress has been made in metallurgical research, however, to enable the visualization of non-rusting metals. At present chromium seems to hold out the most promise for many purposes.

The chemist has completely revolutionized the art of shaping and finishing metals by grinding. Through research, he discovered artificial abrasives (carborundum, alundum, aloxite, etc.) and created grinding wheels and other

shapes. In this way, too, he helped most materially in founding the electrochemical industry, which he has since built up.

The first electrochemical enterprise to be established at Niagara Falls was that of the Aluminum Company of America for the manufacture of aluminum according to the process of a chemist, Charles M. Hall. The electrochemical industry also produces calcium carbide, silicon, cyanamide, graphite, phosphorus, nitric acid, refined lead, ferrosilicon, ferrochromium, other ferro-alloys, sodium, chlorine, and other essential materials of modern life. All these manufactures have been evolved from chemical discoveries. Chlorine is the greatest contribution of the chemist to sanitation. Fully three-fourths of the water supplied to cities in the United States for household use is first chlorine-treated. Nitrogen, oxygen, hydrogen, helium, acetylene, and carbon dioxide are other industrial gases whose production and applications have been worked out by the chemist.

Another very important manufacture that has been due mostly to chemistry is the by-product coke industry. Modern civilization rests largely upon coal and iron, which, in turn, are linked by coke. In making coke other materials, termed by-products, are had, from which modern chemistry has developed thousands of indispensable chemicals, fertilizers, explosives, disinfectants, perfumes, roofings, wood preservatives, medicines, and practically all the dyes used in the textile industry.

#### THE CHEMIST IN THE PORTLAND CEMENT INDUSTRY

In the field of ceramic building materials, the chemist's most notable contributions have been made to the Portland cement industry. It was he

<sup>9</sup> Information received from B. D. Saklatwalla, Vanadium Corporation of America, Bridgeville, Pa.

who surmounted the difficulties encountered in producing a uniform product of good quality. He determined the essential constituents, their necessary proportions, the influence of grinding and mixing of the raw materials, and the proper burning temperature. He then was active in developing mechanical equipment of efficiency and aided valuably in establishing the superiority of American-made Portland cement. The rotary kiln, developed technically by the Atlas Portland Cement Company, is looked upon generally as the leading American mechanical innovation. In 1895, the industry of the United States was producing less than one-third of the Portland cement used in this country. By 1900, however, the American producers began to be rewarded for their support of chemical research. The domestic production of Portland cement was over eight million barrels during this year—eight times greater than five years before—and since then the American industry has grown enormously to meet the requirements of the so-called "concrete age." The annual production capacity of our plants is at least 200 million barrels of Portland cement.

Science is making the road a product far beyond the ability of the old-time road-worker. Highly complex paving mixers leave behind a trail of molded rock that enables the motorist to get the most out of his investment in locomotion. The cost of traveling over the jolting highways of two centuries ago was much higher than the cost of journeying over the best roads of today. Three cents a mile was the average cost in driving an ordinary vehicle. Tax authorities tell us that the cost per mile of smooth motor travel at present, considering gasoline and automobile registration taxes, is but 1.6 cents, and this in money with a lower purchasing

power. Until a few years ago pavement building was such a slow process that it seemed futile ever to hope that hard roads would thread every county and state. In 1910 a month was required to construct a single mile of concrete. Today a gigantic mixer may leave a 1500-foot strip of concrete behind it every eight or ten hours.

#### INDUSTRIAL WATER PROBLEMS

It has cost the industries large sums to learn a little of the importance of water. One manufacturer found out that he had been wasting more than \$100,000 in a single year on raw materials, purchased without regard to moisture content, whereas this sum might have been saved had he realized the importance of the accurate control of moisture.

Large annual dividends are being earned on the investment in research upon boiler-feed waters. One railway finds that a water-treating plant pays for itself each year. Another great system must use a wide variety of water, each requiring special study and treatment. Before a chemist was employed, one run of 563 miles required three or four engines. This run is now made with a single locomotive. In another district the boiler tubes of switch engines had an average lifetime of seven months. Research is responsible for extending this time to thirty-one months. The life of boiler tubes in the more than 1600 locomotives of this railway system has been lengthened from two to four times. With replacement costs above \$1200 per set of tubes, this result indicates a large return on the research and development work. The life of fire boxes, an item approaching \$1700 per engine for renewal, has been multiplied by three.<sup>10</sup>

<sup>10</sup> *Industrial and Engineering Chemistry*, 15 (1923), 223.

## CHEMISTRY AND REFRIGERATION

There is so much engineering involved in some industrial operations and plants that the part played by chemistry in their development is not generally apparent to laymen. Refrigeration is a case in point. History reveals that the vacuum system of ice making was discovered by a chemist, William Cullen, in 1755; that Joseph Priestley, another chemist, ascertained the extreme solubility of ammonia in water, thereby supplying the basis for the water-ammonia absorption machines; that chemical research has evolved the solid adsorbent and absorbent; and that chemistry has developed the various refrigerants that have been used (ammonia, sulfur dioxide, carbon dioxide, ethyl ether, methyl ether, ethyl chloride, methyl chloride, and the hydrocarbons). Chemistry has also solved the complicated lubrication problems that have arisen in the refrigeration field during the past five or six decades, and has investigated and minimized corrosion by calcium chloride used as a "brine" or for transferring refrigeration. In this field, as in most of the other mechanical equipment fields, the research chemist has devised protective coatings or paints for metal surfaces, and has effected improvements in the quality of the materials used in the construction of machinery of all types.

Science entered the food-packing industry somewhat late in its history, at a critical period in its development, when mechanical refrigeration was taking the place of natural ice refrigeration, and mechanical devices the place of hand labor. Thus, the chemist, physicist, and bacteriologist could work hand in hand with the construction engineer and mechanical engineer. During the last decade of the nineteenth century many of the meat packers thought that

their goal had been reached, that all by-products had been saved, and that all operations were carried out in the best manner possible. This idea was a natural one, because of the enormous development of the industry from its simple foundations. It should be borne in mind that packinghouse technology as developed in America is distinctly a new industry and received no guidance from the Old World. Nearly all other industries have been transplantations. The advent of science brought in improved practises in every direction: the industry underwent a new development, which is still in progress; indeed, at present it may be said to be at its height. Perhaps the greatest contribution of science may be summarized in the statement that a certain reasonableness has been introduced into all operations and the bad practises, fads, prejudices, and notions which formerly grew up and had equal standing with very excellent and logical methods have been nearly all eliminated.<sup>11</sup> Science has now permeated every branch of the food-packing business.

## CHEMICAL RESEARCH IN THE ELECTRICAL INDUSTRIES AND IN AVIATION

Chemistry has been of vital importance in perfecting and manufacturing incandescent lamps and also radio tubes. The chemist has developed filaments, methods for removing gases from lamps, and suitable glass; he has also served by making pure, highly conducting copper, and by preparing needed alloys, porcelains, insulation, and dielectrics. The well-known Moore tube and the neon glow lamp are based upon chemical principles.

Great economies have resulted from metallurgical research in the telephone

<sup>11</sup> Statement of W. D. Richardson, Swift & Co., Chicago, Ill. (See *Chemistry in Industry*, New York, 1, 264.)



industry.<sup>12</sup> Two examples will be given here.

Originally, the lead from which cable sheaths are made was given a 3 per cent admixture of tin to obtain the necessary mechanical properties in the alloy. About twenty years ago the price of tin advanced, while the increase in the quantity required for new telephone cable construction became so large that research was called upon to provide a substitute. As a result new sheaths contain one per cent of antimony, and within ten years the new formula earned a saving approximating \$6,000,000.

Another important metallurgical result was an improved contact metal used in the millions of relays and tiny switches required in telephone plants and central stations. In seven years this new metal effected savings that totaled about \$13,000,000.<sup>13</sup>

A few years ago the X-ray tube was an erratic apparatus not in very general use. The research laboratory of the General Electric Company realized that there was a possibility of utilizing pure electronic emission from a hot filament to produce controllable X-rays in a perfect vacuum. This laboratory conducted extensive research upon such devices as then existed, and as a result the tungsten target took the place of platinum in the standard gas tube of that day. Research had also to be applied before the laboratory learned positively that available electrons already existed and there was a possibility of controlling them, as, for example, focusing them on a target. The research has been continued, until today practically all the X-ray tubes of the country are made by the company in accordance

with the discoveries of the man whose name the tubes bear. The Coolidge tube is also used abroad almost to the exclusion of other types. These remarkable results have been achieved through very careful, accurate, and often discouraging studies of electric phenomena in high vacua, with very pure materials. The perfection of the tube is the nucleus of an annual business, including accessories and generating apparatus used in X-ray work, of from five to ten million dollars a year. The benefit cannot be measured wholly in monetary return, however, for everyone can perceive the humanitarian results of this research.<sup>14</sup>

In aviation the chemist first supplied hydrogen and then helium for lighter-than-air craft. He later solved the problem of finding satisfactory leak-proof coverings for gas bags. He has not, however, restricted his efforts to the treatment of fabrics for dirigibles. He has also developed coatings for the cloth coverings of airplane wings and fuselages, antiknock engine fuels, light alloys of aluminum, engine valve alloys, luminous paints, and adhesives (casein and blood-albumin glues).

#### CHEMICAL CONTRIBUTIONS TO AGRICULTURE

The manufacture of fertilizers, an industry of vast proportions, is very closely associated with chemistry and largely dependent on the science for its very existence. Having demonstrated the necessity of the industry by his researches on the composition of soils and plants, the chemist has established the manufacture of superphosphate; he has shown how to convert various minerals and many waste products into plant food constituents, how to change the nitrogen of the air into forms usable as plant nutrients, and how to make sulfate of ammonia from

<sup>12</sup> On other achievements of research on communication, see *Industrial and Engineering Chemistry*, 18 (1926), 661.

<sup>13</sup> *Ibid.*, 15 (1923), 993.

<sup>14</sup> *Ibid.*, 14 (1922), 180.

nitrogenous minerals (*e.g.*, coal); and also he has found the formulas and blends of fertilizing substances best suited for different soils and crops.

The production of fertilizers is the largest heavy chemical industry in America. Within several years the output of commercial fertilizers will probably reach 15,000,000 tons, in which there will be introduced 315,000 tons of nitrogen, about five-sixths of which will be derived from inorganic sources by the chemist's methods.

The growth of the insecticide industry has been enormous. Its development has come from scientific research conducted jointly by chemists and agricultural specialists; it has been stimulated by the realization of the enormous losses in property and life caused by the depredation of insect pests.

It has been estimated that the annual losses in farm crops of the United States, caused by insects, total about \$1,105,000,000. The losses to forest products and products in storage as well as by insect-borne diseases of man and direct or indirect damage to domestic animals are said to be much less in amount, but nevertheless the figure (\$450,000,000) is impressive. It has been calculated that if a pair of insects destructive to plants should increase for three years without hindrance there would be around 6,000,000 of the pests in existence.

#### RESEARCH PRODUCTS FROM PETROLEUM

Benjamin Silliman, Jr., the eminent chemist who conducted the first scientific investigation of crude petroleum, in 1855, wrote that it was a raw material from which might be manufactured very valuable products. With an industrial history covering a period of less than seventy years, crude petroleum now is recognized as a resource of

the highest economic value to society, because it is essential to agriculture, manufacturing, commerce and the pleasures of life. It is the source of gasoline, which is responsible for the development of the internal-combustion engine, the increase in the use of which has strengthened the entire aspect of modern civilization; it gives the world its supply of illuminating oils, which, by bringing a cheap light to millions of people, have constituted America's greatest gift to the uncultured peoples of the globe; and it provides the lubricating oils upon which the complex mechanical equipment of today is dependent for its operation. Then, too, part of the industrial activity of our country rests upon another petroleum product, fuel oil, which also is required for oil-burning ships. The fact that crude petroleum forms the basis for a chemical products industry of almost unlimited possibilities of development, and as distinctive as the coal-tar industry of the present, brings out, in addition, its predominant importance among mineral raw materials.

The most important product obtained from petroleum is gasoline, whose yield American chemists have greatly increased by the development of "cracking" or pyrolytic processes. These methods consist in breaking up, by temperature and pressure, the more complex into the simpler hydrocarbons. Chemical research has also shown how to extract gasoline from natural gas.

#### CHEMISTRY AND COTTONSEED, SUGAR AND CORN PRODUCTS INDUSTRIES

In the cottonseed oil industry chemistry began to take the refinery operations in hand about forty years ago, and the chemist has gradually placed the commercial practise on a scientifically sound foundation. He has improved refining methods, evolved food products, and devised the process of



hydrogenating (hardening) the oil to make wholesome edible fats (such as "Crisco"). It has been estimated that chemistry has thus added over \$10.00 to the value of the crop for every bale of cotton grown. Cottonseed and its by-products are now contributing \$500,000,000 annually to the national welfare through the aid of the oil miller and refiner and the chemist.

Cottonseed linters, the short fibers covering the hull of the kernel, are now being used for making batting, wadding, stuffing material for pads, cushions, comforts, horse collars, mattresses and upholstery, absorbent cotton, mixing with shoddy, mixing with wool in hatmaking, mixing with lambs' wool for fleecelined underwear, felt, low-grade yarns, lamp and candle wicks, twine, rope, carpets, cellulose, artificial sausage casings, writing paper, cellulose acetate, viscose, lacquers, smokeless powder, pyroxylin, artificial leather, waterproofing, collodion, artificial silk, and photographic films.

Someone has said, "the sugar industry without the chemist is unthinkable." This statement is indeed correct, for chemistry has been the main factor in the development of sugar technology. Agriculture, manufacture, refining and uses have depended upon chemistry in this important industry; and the many processes the chemist has worked out have brought better, cheaper sugars and growth to all branches of the sugar producing and consuming manufactures.

The manufacture of glucose and grape sugar, or the corn products industry, was built upon a notable discovery of a chemist, namely, the conversion of starch into reducing sugars. Since then—over a century ago—chemistry and chemists have been inseparably and intimately connected with this great industry. Chemical research has shown how to make profitably corn

syrup, starches, dextrins, many gums (for adhesive purposes), various sugars, gluten feed, oil, oil cake, and other products from corn. The chemist, in fact, has found the way to manufacture over one hundred useful commercial products from this raw material, the fruit of a majestic, wondrous plant.

#### CHEMICAL RESEARCH ON PAPER AND LEATHER

The manufacture of pulp and paper is an industry based largely on chemical reactions and processes. It has therefore depended upon chemistry for its technical maintenance and progress. The development of modern paper making and the enormous extensions of the use of paper in the last quarter-century have been due to the introduction of the three chemical processes, all invented by chemists, by which wood fiber has been made available as a general substitute for rags. Reference is had to the sulfite, soda, and sulfate processes, which have made the paper industry among the largest in the country.

The chemist has provided all the modern methods of mineral tanning for the leather industry; and as for vegetable tanned leather, he has standardized the quality of incoming material and of outgoing product. That the industry is fully cognizant of the utility of chemistry is evidenced by the great increase in the number of tannery chemists during the past forty years as well as by the national research laboratory that is sustained in Cincinnati by a large group of leather industrialists.

#### CHEMISTRY IN TEXTILE TECHNOLOGY

Chemistry has been similarly beneficial in the extensive textile industry, to which chemical research has given bleaching, dyestuffs, mercerization, rayon (man-made silk), and many

other innovations. In modern textile technology the rational methods of the chemist have replaced the uncertain empiricism of the past.

It took about twenty years of scientific research to produce indigo, and thousands of other dyes and related substances have been discovered during the past sixty years through diligent investigation by chemists. Many of these products are indispensable to the health and happiness of man. They constitute a chemical rainbow that makes a pleasing background in the industrial research picture of the present, showing the colorful romance of science and technology.

Prior to the World War the United States was largely dependent upon foreign sources for its supply of dyes. In 1927 dyes of domestic production supplied 94 per cent of our consumption, and there was, in addition, an exportable surplus of the bulk low-cost colors amounting to over 26,000,000 pounds. The 1927 production of approximately 95,000,000 pounds was an increase of 8 per cent over the production of 1926. The sales of dyes in 1927 were about 98,200,000 pounds, valued at \$38,200,000.

Rayon, born of chemistry, is now an important factor in the textile field. Many manufacturers are now making all-rayon fabrics, while others are combining rayon with cotton, silk or wool. About one-fifth of the hosiery produced today contains rayon; millions of yards of cloth are being made annually, either wholly or in part of rayon. Approximately \$100,000,000 is invested in the South's rayon industry.

In 1913 the world output of rayon was about 24,000,000 pounds. In 1924 the total was 142,000,000 pounds, and in 1927 it amounted to 250,000,000 pounds. The 1927 production was made up approximately as follows: United States, 75,000,000 pounds;

Italy, 39,000,000 pounds; Germany, 30,000,000 pounds; Great Britain, 28,000,000 pounds; France, 20,000,000 pounds; Belgium, 16,500,000 pounds; Holland, 14,500,000 pounds; all others, 27,000,000 pounds.

#### INDUSTRIAL RESEARCH IN PROGRESS

During the past spring we carried out at Mellon Institute an inquiry as to the types of problems, or technologic subjects, that were under investigation in the industrial research laboratories sustained by manufacturing companies, associations of manufacturers, consultants, and educational institutions in the United States. Many interesting data came to us in consequence. We found, for example, that there are approximately 1000 such laboratories in this country, all of which are especially equipped for investigating problems in specific industries. The fields covered are also numerous, broad and important, as shown in the following list of the ones having fifty or more research laboratories engaged on their problems (see Table III). This compilation embraces laboratories that are devoting the entire attention of their research staffs to the fields indicated as well as establishments whose work is more varied. While it is quite general in character, it makes clear that there is recognized need for and generous support of industrial research.

The 1000 industrial research laboratories of the United States employ over 16,000 scientists, mainly chemists, and cost about \$110,000,000 a year to operate, everything included. Nearly as much money is being spent annually in transforming the laboratory results into plant practise (sub-commercial development).

#### CONCLUDING OBSERVATIONS

Industrial research and management constitute the means for effecting tech-

TABLE III.—RESEARCH IN VARIOUS INDUSTRIES

Fields	Number of Laboratories Studying Problems
Adhesives . . . . .	50
Automotive vehicles . . . . .	72
Building materials . . . . .	52
Ceramics . . . . .	86
Chemicals, fine . . . . .	54
"    heavy . . . . .	56
Dyes . . . . .	53
Electrical equipment . . . . .	60
Electrochemistry . . . . .	100
Fats, fatty oils and soaps . . . . .	81
Foods and beverages . . . . .	142
Fuels and their utilization . . . . .	148
Metallurgy . . . . .	249
Paints and varnishes . . . . .	107
Petroleum products . . . . .	90
Plastics . . . . .	53
Pulp and paper . . . . .	87
Rubber goods . . . . .	53
Textiles . . . . .	56
Water, sewage and sanitation . . . . .	71

nologic telestis, *i.e.*, progress in manufacturing through conscious planning and by the application of intelligently directed effort. The highest aim of industrial research is to deduce the principles of technology and to apply

them to the future as well as to the present. Thus by cultivating the field of industrial research we are gradually evolving a system of technologic laws, a definite technonomy, in addition to meeting immediate industrial requirements by solving urgent manufacturing and economic problems. The study of industries in their historic development, location, distribution, and strictly commercial aspects is a subject of constantly increasing usefulness in technology and hence in industrial research.

Technonomy has been referred to as the chief or ultimate aim of industrial research. The highest good of such research in an existing technic field is perfection of process, practise and product, through experiment, invention, and development; and in a new field, the working-out of manufacturing procedure and the discovery of uses for the products, thereby giving rise to a novel industry. The successful direction of research activity towards the achievement of such an important end as a new branch of manufacture that fills a real need is the most valuable contribution that can come from any one industrial research group or laboratory.

# The Present Legal Status of Open Price Associations

By FRANKLIN D. JONES  
Counsellor at Law, Washington, D. C.

THE term "open price association" has no precise meaning and is generally applied broadly to all those associations whose members exchange statistical data on prices, sales, shipments, stocks, orders, costs and the like.

The legality of the exchange of such data has been for years in dispute. Secretary of Commerce Hoover and the United States Chamber of Commerce endeavored with partial success to secure from the Attorney General an opinion which would define the proper limits of such activities. To them is largely due the credit for the analysis of economic facts and effects which finally resulted in the recent decisions of the United States Supreme Court clarifying the legal status of this form of association activity.

## PRINCIPLE ESTABLISHED BY SUPREME COURT

The Supreme Court has now established the broad principle that the mere exchange and publication of such data under proper safeguards, when there exists no agreement or concerted action with respect to prices, production, or other restraint on competition, is not a violation of the anti-trust laws. This rule is stated by the Supreme Court in the following language:

We decide only that trade associations or combinations of persons or corporations which openly and fairly gather and disseminate information as to the cost of their product, the volume of production, the actual price which the product has brought in past transactions, stocks of merchandise on hand, approximate cost of transportation from the principal point of shipment to the points of consumption, as did these defendants, and who, as they did, meet and

discuss such information and statistics without, however, reaching or attempting to reach any agreement or any concerted action with respect to prices or production or restraining competition, do not thereby engage in unlawful restraint of commerce.<sup>1</sup>

The data thus far held to be the proper subject of associated activity under the limitations prescribed by the court are the following:

(1) Volume of production; (2) stocks on hand; (3) shipments; (4) cost of product; (5) approximate cost of transportation, including freight rate books; (6) credits; (7) specific job contracts, where joint information is necessary to protect against fraud or deception; (8) reports on return of containers and percentage unfit for use.<sup>2</sup>

It is extremely important to note that the Supreme Court carefully limits its decisions so as not to legalize even tacit agreements or understandings affecting prices or production springing from the exchange of statistical data. In the hardwood case, the court said:

To show a violation of the statute, it was sufficient to prove concerted action pursuant to an actual or tacit agreement which would naturally and directly curtail the production or increase the price of lumber moving in interstate commerce.<sup>3</sup>

In the linseed oil case,<sup>4</sup> the court again, after an examination of the entire statistical system of the defendants, held that its necessary tendency was to suppress competition and

<sup>1</sup> *Maple Flooring Association v. United States*, 268 U. S. 563, 586 (1925). See also *Cement Manufacturers Association v. United States*, 268 U. S. 588, decided the same day.

<sup>2</sup> See maple flooring and cement cases, *supra*.

<sup>3</sup> *American Column Co. v. United States*, 257 U. S. 377, 389.



that it was therefore unlawful. In the maple flooring case, *supra*, the court referring to these two decisions said:

We realize that such information gathered and disseminated among the members of a trade or business may be the basis of agreement or concerted action to lessen production arbitrarily or to raise prices beyond the levels of production and price which would prevail if no such agreement or concerted action ensued, and those engaged in commerce were left free to base individual initiative on full information of the essential elements of their business. Such concerted action constitutes a restraint of commerce and is illegal.<sup>5</sup>

The court then held that "In the absence of proof of such agreement or concerted action having been actually reached or actually attempted" the mere gathering and dissemination of such facts would not be unlawful. *Tacit agreements or concerted action* may be so easily reached or attempted that great care is necessary in the administration of any statistical system.

The obvious benefits of the dissemination of such data from the standpoint of an industry or of public policy will not be here discussed.<sup>6</sup> Associations generally are recognizing the extreme importance of a widespread knowledge of the basic facts of their industries.

#### LIMITATIONS OF CONCERTED ACTION

In dealing with this problem it is necessary to always bear in mind the wide distinction the court makes between individual action, where great freedom is permitted, and concerted action, where the public interests re-

quire careful limitation because of the vastly greater power for harm involved. This distinction was emphasized by the Supreme Court in the linseed oil case, *supra*. The problem of the court has been to strike a balance which will allow the maximum of concerted action without destroying the rights of individual traders, and without infringing on the rights of the public. The decisions of the Supreme Court have carefully laid down limitations for this form of concerted action, and association officials would do well to closely follow them.<sup>7</sup> These may be enumerated as follows:

First: The data should cover past, closed transactions rather than future ones. The Supreme Court was careful to point out in the maple flooring case that "all reports of sales and prices dealt with past and closed transactions," distinguishing that case from the linseed oil case, among other grounds, by the fact that the linseed organization was publishing the current price quotations for future sales. Were associations permitted to publish the future prices their members expected to maintain, or the production they planned to manufacture, such statistical systems would become veritable traps for bringing about tacit agreements as to price or production in violation of the law. The law, however, does permit an industry, by concerted action, to secure all the basic facts as to supply and demand and the prices actually realized on sales so that the entire history of the past up to the moment is available to the individual in determining his own future business policy.

Second: Secrecy should be avoided by the publication of the data in the

<sup>7</sup> For an excellent discussion of this subject, see "Trade Association Statistics; the Legal Aspects," by Benjamin S. Kirsch, *American Bar Association Journal*, March, 1928.

<sup>5</sup> *United States v. American Oil Co.*, 262 U. S. 371, 389.

<sup>6</sup> *Maple Flooring Association v. United States*, 268 U. S. 563, 585.

<sup>6</sup> Cf. "Business Statistics as a Means of Stabilizing Business," *Proceedings of the Academy of Political Science*, Vol. XI, No. 4, January, 1920, and "Trade Statistics and Public Policy," *Harvard Business Review*, July, 1925, by the writer.

trade papers or other media available both to buyers and sellers. A situation might arise if only one side of the market had such information which would be unfair to traders on the other side of the market, and might likewise affect the public. In the linseed oil case the court commented on the unfairness of a situation where the sellers exchanging such confidential information among themselves "went forth to deal with widely separated and unorganized customers necessarily ignorant of the true conditions," and pointed out that a system of secret exchange of such information did not bear the slightest semblance to the ordinary practice of trade or stock exchanges. In the maple flooring case, the court seemed to give considerable weight to the fact that the statistics gathered by the association were given wide publicity. If the real purpose of an association is to secure stabilized conditions, such a result can be achieved only by the widest publicity of the facts. It is doubtful, however, whether the court would hold that cost data must be given publicity.

Third: The data disseminated must be accurate. The court repeatedly in the decisions carefully refers to "actual prices," "actual sales," and the right to "fairly gather and disseminate information." For centuries it has been unlawful at common law to disseminate false information for the purpose of enhancing or curtailing prices.<sup>5</sup> Unless all data are published, a statistical system can easily be used, by the elimination of part of the data reported, as a device for fraudulently increasing or decreasing prices and thus become an unlawful concert of action.

Fourth: The data should not make a minute disclosure of the business of an

individual concern to his competitors. The data collected should be made available to members without disclosing information received from each member. The proper purpose of such statistical information is to give to each member the basic facts affecting his industry rather than exact knowledge of what each competitor is doing. When individual figures are identified, the possibility of pressure being exerted on members whose prices are out of line is greatly increased and a situation exists which invites action in violation of the law. In the hardwood case, the Supreme Court commented on this phase of the hardwood plan. In the maple flooring case, on the other hand, where the system was held to be lawful, this feature was eliminated.

Fifth: Advice or suggestions by association officials as to the significance of data published should be avoided. In the hardwood case the court commented on the "significant suggestions as to both future prices and production" made by the secretary of the association. Obviously suggestions by an association official, if followed by members, could quickly create a situation in violation of law, substituting concerted action for individual action of members on the same facts.

Sixth: Penal provisions in the form of fines, expulsion and the like, backed by a rigid supervision to check violation, should be avoided. These features of the linseed oil plan were severely condemned by the court. They afford the means through which group pressure can be easily exerted and concerted action, with reference to price, production and the like, substituted for individual action.

Finally, the discussion of such data at meetings is dangerous. The court in the maple flooring case held that it is lawful to "meet and discuss such information and statistics without, how-

<sup>5</sup> Illingworth, *Inquiry in the Laws Respecting Forestalling, etc.*, 1800, p. 14; Burns, *Justice*, 1769, 11th ed., p. 195.



ever, reaching or attempting to reach any agreement or any concerted action with respect to prices or production or restrain competition," but the practical difficulty is in avoiding such tacit agreements when men discuss such facts in groups. Gentlemen's understandings with reference to future policies affecting such matters are unlawful, and if an association deems such discussions important, the only safe procedure is to follow that of the cement association where, as pointed out by the court, "the Association counsel was present at each meeting to steer the discussion away from illegal subjects."

Obviously all these qualifications of the Supreme Court are intended to prevent the possibility of substitution of joint judgment for individual judg-

ment,—to forestall the misuse of statistics by tacit, concerted action. The law allows concerted action to make available all of the facts on which the business man may make his own intelligent analysis of market conditions and fix his individual policy; it prohibits further concerted action to secure uniformity of policy among competitors based upon such facts. It permits stabilization of the market through the natural reaction of intelligent business men to known facts; it prohibits attempts to artificially stabilize the market through arbitrary agreements or understandings of any character whatsoever. These decisions of the Supreme Court have thus gone far in defining the legal limits of this form of association activity.

## Recent Developments in Trade Association Law

By GILBERT H. MONTAGUE

Member, New York Bar

**T**RADING associations, since the Supreme Court decisions in June, 1925, in the Cement and Maple Flooring cases, have been free to exchange information regarding past prices, stocks on hand, production, shipments, costs, job contracts, freights and credits, so long as such associations and their members keep themselves clear from any agreements, understandings or concerted action on these subjects.

Uniformity of prices, as the Supreme Court recognized in these decisions, may be the consequence of such exchange of information, even though such exchange takes place without any agreements, understandings or concerted action on the part of the trade associations or their members.

So long as these consequences are, to quote the Supreme Court, "such as would naturally ensue from the exercise of the individual judgment of manufacturers in determining, on the basis of available information, whether to extend credit or to require cash or security from any given customer," and so long as the resulting uniformity of prices follows simply from "the necessary leveling effect upon prices of knowledge disseminated among sellers as to some of the important factors which enter into price," there is no violation of the anti-trust laws.

### THE SUPREME COURT ON COMPETITION

"It is not, we think, open to question," said the Supreme Court, "that the dissemination of pertinent information concerning any trade or business tends to stabilize that trade or business

and to produce uniformity of price and trade practice. Exchange of price quotations of market commodities tends to produce uniformity of prices in the markets of the world. Knowledge of the supplies of available merchandise tends to prevent overproduction and to avoid the economic disturbances produced by business crises resulting from overproduction. But the natural effect of the acquisition of wider and more scientific knowledge of business conditions, on the minds of the individuals engaged in commerce and its consequent effect in stabilizing production and price can hardly be deemed a restraint of commerce, or if so it cannot, we think, be said to be an unreasonable restraint, or in any respect unlawful."

"It is the consensus of opinion of economists and of many of the most important agencies of Government," the Supreme Court declared, "that the public interest is served by the gathering and dissemination, in the widest possible manner, of information with respect to the production and distribution, cost and prices in actual sales, of market commodities because the making available of such information tends to stabilize trade and industry, to produce fairer price levels and to avoid the waste which inevitably attends the unintelligent conduct of economic enterprise. Free competition means a free and open market among both buyers and sellers for the sale and distribution of commodities. Competition does not become less free merely because the conduct of commercial operations becomes more in-

telligent through the free distribution of knowledge of all the essential factors entering into the commercial transaction. General knowledge that there is an accumulation of surplus of any market commodity would undoubtedly tend to diminish production, but the dissemination of that information cannot in itself be said to be restraint upon commerce in any legal sense. The manufacturer is free to produce, but prudence and business foresight based on that knowledge influences free choice in favor of more limited production. Restraint upon free competition begins when improper use is made of that information through any concerted action which operates to restrain the freedom of action of those who buy and sell."

"It was not the purpose or the intent of the Sherman Anti-Trust Law," said the Supreme Court, "to inhibit the intelligent conduct of business operations, nor do we conceive that its purpose was to suppress such influences as might affect the operations of interstate commerce through the application to them of the individual intelligence of those engaged in commerce, enlightened by accurate information as to the essential elements of the economics of a trade or business, however gathered or disseminated. Persons who unite in gathering and disseminating information in trade journals and statistical reports on industry; who gather and publish statistics as to the amount of production of commodities in interstate commerce and who report market prices are not engaged in unlawful conspiracies in restraint of trade merely because the ultimate result of their efforts may be to stabilize prices or limit production through a better understanding of economic laws and a more general ability to conform to them, for the simple reason that the Sherman Law neither repeals economic

laws nor prohibits the gathering and dissemination of information. Sellers of any commodity who guide the daily conduct of their business on the basis of market reports would hardly be deemed to be conspirators engaged in restraint of interstate commerce. They would not be any the more so merely because they became stockholders in a corporation or joint owners of a trade journal, engaged in the business of compiling and publishing such reports."

"Viewed in this light," the Supreme Court continued, "can it be said in the present case, that the character of the information gathered by the defendants, or the use which is being made of it, leads to any necessary inference that the defendants either have made or will make any different or other use of it than would normally be made if like statistics were published in a trade journal or were published by the Department of Commerce, to which all the gathered statistics are made available. The cost of production, prompt information as to the cost of transportation, are legitimate subjects of inquiry and knowledge in any industry. So likewise is the production of the commodity in that industry, the aggregate surplus stock and the prices at which the commodity has actually been sold in the usual course of business."

"We realize," said the Supreme Court in conclusion, "that such information gathered and disseminated among the members of a trade or business may be the basis of agreement or concerted action to lessen production arbitrarily or to raise prices beyond the levels of production and price which would prevail if no such agreement or concerted action ensued, and those engaged in commerce were left free to base individual initiative on full information of the essential elements of their business. Such concerted action constitutes a restraint of commerce and

is illegal and may be enjoined as may any other combination or activity necessarily resulting in such concerted action. . . . But in the absence of proof of such agreement or concerted action having been actually reached or actually attempted, under the present plan of operation of defendants we can find no basis in the gathering and dissemination of such information by them or in their activities under their present organization for the inference that such concerted action will necessarily result within the rule laid down in those cases.

"We decide only that trade associations or combinations of persons or corporations which openly and fairly gather and disseminate information as to the cost of their product, the volume of production, the actual price which the product has brought in past transactions, stocks of merchandise on hand, approximate cost of transportation from the principal point of shipment to the points of consumption as did these defendants and who, as they did, meet and discuss such information and statistics without, however, reaching or attempting to reach any agreement or any concerted action with respect to prices or production or restraining competition, do not thereby engage in unlawful restraint of commerce."

#### ATTEMPTS TO CONTROL TRADE PRACTICES

These rules, which for accuracy I have set forth in the Supreme Court's language, are the tests by which must be judged the legality of all present-day trade association activities.

The legal problem which forever confronts trade associations and their counsel is, therefore, to avoid, in all that they do, "any concerted action which operates to restrain the freedom of action of those who buy and sell," and "any agreement or any concerted

action with respect to prices or production or restraining competition."

Eternal vigilance, therefore, is the price of safety, in all trade association activities of the character discussed by the Supreme Court in the Cement and Maple Flooring decisions.

Several months ago, a trade association in a staple industry dealt in its code of ethics with the thorny question of prices substantially in this wise:

This Association declares its policy to be founded upon, and recommends to its members the adoption of business methods in accordance with, the following principles, to wit:

1. All discriminations between customers should be abolished. To that end, products should be sold only upon open prices and terms publicly announced.

2. Concessions made by the industry for the quantity of products purchased have resulted in discrimination between customers, which discrimination this Association believes it to be in the interest of the industry, of the trade and of the public to avoid. This Association accordingly condemns as discriminatory, and insofar as this industry is concerned, as unbusinesslike, uneconomic and unsound, concessions made to purchasers on the basis of quantity purchased.

3. The following trade practices, viz.,

Variations from the open and publicly announced prices and terms, split billings, the use of differential rates on consignments, payment of brokerage where any part thereof inures to the benefit of the purchaser, storage of products in customers' warehouses, allotments to brokers running beyond the business of the day on which the advance in price is announced, and special services to customers without appropriate charges therefor,

if not uniformly employed with all customers are discriminatory. Furthermore, if not secretly employed, they will of necessity be generally demanded, with the result that they must be uniformly employed or abandoned. If uniformly employed, they amount to a general price concession which

should frankly take the form of a price reduction. This Association condemns them as unethical except when practiced openly; as discriminatory unless uniformly employed; and in any event as wasteful and unbusinesslike.

#### RECOMMENDATIONS VS. AGREEMENTS

By using the words "declares," "recommends," "condemns," and similar words, all falling short of the word "agrees," the trade association which adopted the code of ethics above quoted believes that it has successfully stopped short of the point at which this code of ethics might be construed to be "any concerted action which operates to restrain the freedom of action of those who buy and sell" and "any agreement or any concerted action with respect to prices or production or restraining competition."

Several months after the above quoted code of ethics had been adopted by this association, another trade association, in another staple industry, dealt with this thorny question of prices substantially in the following ways:

This Association is founded upon the following principles:

1. Adherence to law, and particularly to the laws prohibiting fixing of prices, the allocation of or discrimination between customers, the allocation of territory and the control of production in restraint of trade.

2. The avoidance of unfair discrimination between customers. To that end, products should be sold only upon prices and terms made by each member acting independently and immediately thereafter publicly announced. No member would be obligated to any other member or to this Association to continue the use of such prices or terms for any period, but would reserve the right to change them at will, and would announce any departure from the same immediately that it is made. A manufacturer may charge a higher price for special service and/or for superior quality,

without making such higher price a part of his announced schedule.

3. These announced prices should be absolutely net, without any form of secret price concession whatever. A price concession in any form whatsoever if employed with one customer is discriminatory unless employed with all customers. If thus uniformly employed it amounts to a general price concession which should frankly take the form of a price reduction. Any possible form of price concession is unethical, except when practised openly; is discriminatory unless uniformly employed, and in any event is wasteful, unbusinesslike and damaging to wholesome competition.

We, the undersigned, hereby associate ourselves as members of this Association, and hereby severally subscribe to the above, subject, however, to the approval of the Department of Justice and the Federal Trade Commission.

Then followed a list of the signatory companies, with the addresses and names of the representatives of each company that signed.

This association, it will be noted, did not stop with a statement that it "declares," "recommends" or "condemns."

This association went beyond these words, and uses the language and form of an actual, signed agreement.

On the face of it, this seems to reach the point where this may be construed to be "concerted action which operates to restrain the freedom of action of those who buy and sell" and "agreement or concerted action with respect to prices or production or restraining competition."

One very broad exception to the above rule seems to be recognized:

If the "agreement or concerted action" merely operates to restrain a trader's "freedom of action" to indulge in unfair competition or in some other unlawful act, the prohibition against "any agreement or any concerted action" seems not to apply.



"Agreement or concerted action" which simply binds the parties to abstain from an illegal transaction seems not to be in violation of the anti-trust laws.

#### POLICY OF THE FEDERAL TRADE COMMISSION

On this proposition rests the trade practice procedure of the Federal Trade Commission, of which the following is an illustration:

On December 10, 1927, the shirtings industry met with representatives of the Federal Trade Commission and drew up four rules which the industry then submitted to the Commission for the latter's consideration and action.

These rules, as published on January 26, 1928, by the Federal Trade Commission, are as follows:

##### GROUP I

*Rule 1.* "Resolved, That the members of the Shirting Fabrics Industry condemn as unfair trade practice the misbranding of merchandise on the part of converters, shirt manufacturers and others, and pledge themselves to make every effort within their power to discourage and stamp out this serious evil at present existing in this industry.

*Rule 2.* "Whereas, much confusion has arisen in the industry, resulting in many instances in unfair competition, as a result of members of the industry selling their merchandise on a basis of free delivery in some instances, and in others selling the same f.o.b. mill; therefore, in order to free the industry of this evil,

"Be It Resolved, That, effective immediately, all members of the industry will sell their goods on the basis of f.o.b. point of origin."

##### GROUP II

*Rule 3.* "Whereas, a practice has arisen among some shirt manufacturers and converters of usurping styles, the products of others, and in many instances using them on cheap merchandise; and

"Whereas, such action on the part of manufacturers and converters is wholly improper from every standpoint of fair dealing and business honesty; therefore,

"Be It Resolved, That the members of the Shirting Fabrics Industry go on record as being unalterably opposed to any piracy of styles, that they condemn such action, and that they will make every effort within their power to bring about the discontinuance of such practices.

*Rule 4.* "Resolved, That the members of the industry will, effective immediately, discontinue entirely the practice of giving away free sample cards, and hereafter will make a charge for all sample cards furnished, at each member's individual price for the fabric plus all other costs entailed.

"Reference sheets not to exceed three in number may be furnished free; size of swatches not to exceed 2 x 4 inches and not to be mounted on customer's cards; all reference sets to be plainly stamped, 'For reference only.' No sample cards are to be given free. When sample cuts are required they are to be furnished and charged for at sale price of fabric. Reproductions are to be furnished in any quantity, a charge being made for fabric used based on each member's individual sales price for the fabric plus the cost of mounting."

When the Federal Trade Commission published these rules, the Commission announced that "as regards those included in Group I, the Commission has affirmatively approved the same as fair methods of competition for the industry and has undertaken to enforce the same by proceeding against infractions thereof under the Federal Trade Commission Act. As regards those included in Group II, the Commission concluded that it could not affirmatively approve them and undertake to enforce them for the reason that it could not predict in every case what the results of such procedure would be. The inclusion of particular

resolutions in Group II does not mean that they have been actually disapproved, or that the Commission would not, in a proper case, undertake to give them effect. It means only that the Commission has not deemed it advisable to take any position in regard to such resolutions as would preclude entire freedom of action in reference to any state of facts which may be presented in the future."

"Agreements or concerted action" to abstain from unlawful practices seem, therefore, not to be forbidden by the anti-trust laws.

With this exception, however, the prohibition of the law runs against all "concerted action which operates to restrain the freedom of action of those who buy and sell" and "any agreement or any concerted action with respect to prices or production or restraining competition."

"Agreements or concerted action," as the Supreme Court repeatedly has held, "need not be written, or oral, or even express, but may be implied from a course of dealing or other circumstances" on the part of trade associations and their members.

Resourceful prosecutors, in proceedings under the anti-trust laws, are usually able, without much difficulty, to

introduce enough testimony and exhibits so that the jury or the court generally has some evidence on which it is entitled to find, if it be so disposed, that an "agreement or concerted action" in violation of the anti-trust laws can be "implied from a course of dealing or other circumstances" on the part of the trade association or its members.

How serious this is may be clearly realized when it is remembered that by the settled law of the federal courts neither the United States Circuit Court of Appeals nor the Supreme Court of the United States will or can upset the finding of a jury or court as to the existence of any "agreement or concerted action," if any evidence whatsoever can be "implied from a course of dealing or other circumstances" which can support any such finding.

With the exception above noted, therefore, "agreements and concerted action" must always be avoided. And with equal care, every possible appearance of "any concerted action which operates to restrain the freedom of action of those who buy and sell," and every possible appearance of "any agreement or any concerted action with respect to prices or production or restraining competition," must also be avoided.

# Price Stabilization Through Trade Organization and Statistical Coöperation

By MYRON W. WATKINS

National Industrial Conference Board, Inc., New York City

THE problem of industrial stabilization is a two-horned dilemma. It cannot be too frequently emphasized that fluctuations in productive operations and fluctuations in prices represent no single economic evil. They are not different aspects of one order of phenomena. They are neither identical in nature, concurrent in appearance, nor uniform in effect. At the same time, they are not independent problems. They may be most aptly described perhaps as compensating opposites. When the one evil becomes too great to be longer suffered, it is checked by a deliberate introduction of the other—much as one strongly corrosive acid may be used to neutralize the disintegrating action of another. Thus a rise in price is checked by an expansion of production. And it is important to observe that, other things remaining the same (*i.e.*, no falling-off of demand, no change in the technological situation, and no increase in the ratio of circulating media to the volume of trade), there is no other way in which a rise in price can be checked. Correlatively an increase of output tends to induce a fall in price. Only in that way, other things remaining equal, can the increasing output be checked. But these are not the phases of fluctuations in business which are commonly recognized as evils. The converse of each of these propositions holds equally true, however. A decline in price can be arrested only by decreasing output; and a declining production will tend to give greater firmness to prices.

These things are axiomatic, alike in

the business world and in economics. They would not be repeated here, were they not so often overlooked in discussions of industrial stabilization. It somehow seems to have become currently accepted that if price stability were once achieved, output stability would necessarily follow. This is the most common assumption, but the opposite inference is also met with occasionally—that regularizing production will stabilize markets. As a general rule, neither of these assumptions is sound. Everyone will agree that demand and supply are brought into equilibrium, or balanced, by price.

## MEETING MARKET CHANGES

The necessary adjustments to meet every possible change in market conditions may be indicated in the following propositions:

Proposition I. Demand increasing and supply, or rate of production, remaining unchanged, price advances.

Proposition II. Demand increasing and supply, or rate of production, increasing correspondingly, price remains the same.

Proposition III. Demand decreasing and supply, or rate of production, remaining unchanged, price declines.

Proposition IV. Demand decreasing and supply, or rate of production, decreasing correspondingly, price remains the same.

*Mutatis mutandis*, Propositions II and IV may be used to illustrate the effect of changes from the market

situation when such changes are *initiated* on the *supply* side, instead of on the demand side. But if supply, or rate of production, be supposed to increase, while demand remains the same, then price declines. If supply, or rate of production, declines, on the other hand, the demand remaining the same, then price increases.

These propositions exhaust all the possibilities of change in the market situation, starting from any given adjustment of supply and demand. They have been set out in detail, at some risk of tediousness, in order to emphasize this essential and inescapable principle: *that price stability must mean output elasticity, and that output stability must mean price variability.* In the economic world as it is, a dynamic world and one ruled by the quest of profit, you may have the former and renounce the latter, or choose the latter and forego the former. You cannot have both, accepting the fundamental conditions as posited. Suppose, for example, in accordance with the illustration in Proposition III, that there is a falling off in the demand for overalls. This decline in demand may be either of a general and permanent nature, connected with slow changes in workingman psychology and standard of living, or of a temporary and ordinary seasonal nature, connected with the intermission in agricultural labor during the winter months. Of whichever character it may be, it is clear that, while something may be done by indirect means to arrest or offset the change in demand, it cannot be controlled by producers. Moreover, whatever *may be done* to checkmate the tendency *costs* something, and to that extent leaves the overall manufacturers no better off than if they had accepted at once a reduced price on their products and continued to manufacture them in the same volume as thereto-

fore, or had maintained the old price and curtailed the amount of output. In whichever way they decide to meet the situation, and whether they meet it by individual or collective action, they stand to lose. They have a choice only of the lesser evil. And even were the change of an opposite character, as exemplified by the suddenly stimulated demand for overalls at the time of the "buyer's strike" in 1919, the choice would be a happier one, but none the less a choice. The adjustment might be made either as illustrated in Proposition I or in Proposition II. But it could not be made in *both* ways *fully*. If made in accordance with Proposition I, the overall manufacturers would have maintained output stability at the expense of price stability. If made in accordance with Proposition II, they would have maintained price stability at the expense of output stability.

#### RISK OF PRICE CHANGES

The foregoing analysis will have served its purpose as an introduction to this paper if it has made clear the futility of discussing the advantages of trade association activity in stabilizing industry without distinguishing sharply between the stability of production and the stability of prices. The purpose of this entire series of papers is, indeed, to inquire into the means and the achievements of price stabilization. That object is sufficiently definite. But in order that there may be no suspicion, when it is attained, that the whole inquiry is beside the point, it may be well to address ourselves here to the fundamental question raised by coöperative trade activities to stabilize prices. That question is neither what can be done, nor what has been done, nor how it may be done, but what *should* be done. Put somewhat less baldly, the question is to what extent there is social justification for attaching primary im-



portance to market stability and only secondary importance to regularity of production. The answer, let it be at once admitted, is: not much. The space at our disposal will not permit a detailed examination of the grounds for this conclusion. It must suffice to point out that workmen, forming by all means the larger part of the producing classes, have a paramount interest in regular employment. Fluctuating prices may be to them an annoyance, but fluctuating productive operations are a scourge. On the other hand, changes in the pace of productive activity mean only slight inconvenience and comparatively slight losses or gains, as the case may be, to business men,—and the losses in considerable part take the innocuous form of profits foregone. But changes in prices concern them deeply. Their whole preoccupation is with price margins. While comparatively slight price changes in the right direction may bring them substantial gains, it is equally true that it takes no very considerable price changes in the wrong direction to wipe out profits and eat into capital. It is these changes, consequently, of which they live in mortal dread. Eliminate the risk of price changes and you would make the business man's berth a bed of roses. There is, of course, the function of routine administration, but no great loss of sleep was ever occasioned by that responsibility. Like all honest labor, it induces rather than disturbs restful repose.

#### OBJECT OF COÖPERATIVE EFFORTS IN TRADE

It is easy to understand, consequently, why price stability tends to be over-emphasized in discussions of and programs for industrial stabilization. But to recognize this is far from denying that price stabilization is important, and a worthy object of coöper-

ative efforts in trade. In the first place, the interests of business men, while they are not the sole proper interests of the economic process, are among the interests which it should subserve. In the second place, notwithstanding what was pointed out in the first part of this paper, price stability is not *invariably* opposed to stability of operations. In so far as price fluctuations are a response to forces operating on the supply side of the market their reduction may in some measure promote regularity of operations without countervailing economic losses. We have in mind here particularly the price changes induced by a want of foresight or of circumspection in marketing policy, which leads some producers to "sell as they go," making no attempt, or only poorly judged attempts, to introduce some "play" between manufacturing and selling. A similar situation may be created by a want of resources or of accurate information which impels some producers to do what they would otherwise not do. These things tend to spoil "bad markets" still more, and make "good markets" more speculatively attractive. They promote unearned gains and unmerited losses. They convert business into a gamble. By reducing these evils through intelligent coöperation and stabilizing prices, trade associations not only relieve their members of a vexatious burden, but they contribute to the smoother functioning and the more fruitful outcome of the industrial process. Customers, consumers, material-supply dealers, and employees all share with the manufacturers the gains resulting from the elimination of febrile and uneconomic price variations. What part of all price variations are of this character can only be guessed, and the percentage no doubt differs widely in different markets or trades and in different periods. But few will contend that the



unwarranted and excessive price variations under conditions of disorganized and spasmodic distribution may not be minimized by making available to all producers full information upon the basic factors in the market. Trade associations cannot compel adherence to sound marketing policies, but they can do a great deal to encourage the general adoption of such policies, by making known the actual facts. Business judgment can then be trusted to do its part, as a rule.

It will afford some notion of what may reasonably be expected from trade cooperation in reducing the risk of price changes, to consider for a moment what has been accomplished in this way in the reduction of another type of risk. The risk of employer's liability for industrial accident was formerly a considerable burden upon enterprise in many lines of manufacture. Workmen's compensation laws provided a direct and substantial inducement to minimizing this risk. And much was done through the isolated efforts of individual manufacturers to eliminate unnecessary hazards within their plants. But the pooling of the risk through insurance, nevertheless, became practically indispensable, and therewith developed organized efforts in each branch of industry to reduce accidents and secure lower rates for the trade. The superior efficacy of industry-wide cooperation in disseminating the idea of "Safety First" and in uncovering new safety devices and methods has been amply demonstrated by experience in the past fifteen years. No single shoe manufacturer, to take that industry as an example, can be coerced to adopt recognized safety standards or devices to the end that the insurance rate for the industry may be cut down. But such a course is not necessary. It suffices, as a rule, that each manufacturer be apprised of what should be

done, or what is being done elsewhere, to bring about his participation in the improvement. In a similar fashion trade cooperation will work to reduce the risk of price changes.

Just how this trade cooperation may proceed, within the legal boundaries, is the remaining question we have here to consider. Briefly, it may be said that so long as no compulsion is exerted upon outsiders<sup>1</sup> and so long as there is no mutual undertaking to act in a definite way upon the data reported to or distributed by the association<sup>2</sup> the members of a trade group may interchange practically any information which they deem expedient. It is not the character of the information assembled and reported but the use made of it which is the vital factor in the legality of trade association statistical services. As the Supreme Court declared in the *Maple Flooring Association* case,

Competition does not become less free because the conduct of commercial operations becomes more intelligent through the free distribution of knowledge about *all the essential factors entering into the commercial transaction*. . . . Restraint upon competition begins when improper use is made of the information through any concerted action which operates to restrain the freedom of action of those who buy and sell.<sup>3</sup>

In view of the decision in this and the concurrent *Cement Association* case,

<sup>1</sup> *Eastern States Lumber Assn. v. United States*, 234 U. S. 600 (1914), p. 608: "When viewed in the light of the history of these associations and the conflict in which they were engaged to keep the retail trade to themselves, . . . there can be but one purpose in giving the information in this form to the members of the associations. . . . He is blind indeed who does not see the purpose in the predetermined and periodical circulation of this report to put the ban upon wholesale dealers whose names appear in the list."

<sup>2</sup> *Federal Trade Commission v. Pacific Coast Paper Trade Assn.*, 273 U. S. 52 (1927).

<sup>3</sup> *Maple Flooring Mfrs' Assn. v. United States*, 268 U. S. 562 (1925). Italics not in the original.

it cannot be doubted that manufacturers may, through their associations, compile and furnish the trade with information concerning amount of production, shipments, inventories, costs, freight rates, and prices.<sup>4</sup> Presumably, too, the reports may specify these data for particular producers and for individual transactions.<sup>5</sup>

#### ESTABLISHMENT OF INDUSTRIAL INSTITUTES

The recent movement towards the establishment of industrial institutes affords a good opportunity to test the scope and meaning of these settled principles.<sup>6</sup> These organizations are designed to effect agreements upon such matters as the law sanctions, and where agreements must be avoided, as in respect to prices, to make available prompt and complete information to serve as a guide to their members. Their evident and avowed purpose is to stabilize the markets. Without specifying any particular institute, let us say agreements are made to standardize trade discounts, to make a uniform guarantee as to strength or life of product, to grant a uniform allowance for defective goods, to standardize the refund made for returned containers, to invoice all sales from a common basing point, and to make no bids upon special or "future" orders at prices

other than those quoted by each upon his current list, filed with the Director of the Institute, without giving immediate notice to the Director of the particulars of such bid. In addition to these mutually binding agreements the manufacturers severally engage to report regularly each week the amount of their production, shipments and inventories, and the volume and distribution of their sales. Let it be assumed that these statistics, showing the data for the several individual companies as well as the totals, are distributed promptly to all members and made available in the form of aggregates just as promptly, through publication in the trade press and through governmental agencies, for the information of whoever may be concerned. Suppose, moreover, that the current list of prices of each manufacturer is circulated generally in the trade by the individual company in the course of its struggle for sales, though the Institute as such takes no action, and is not authorized to give to non-members any information concerning the prices of particular members. Finally, it may be supposed that the terms of the bid made by a given company for a special, or large, order are neither circulated by the bidder nor released by the Director of the Institute to anyone except members, and to them only upon request.

Does such an organization contravene the provisions of the anti-trust laws, granting that in other respects than the features above described, there is no possible ground for complaint? Considered separately, agreements of the type of all of those mentioned, except the last one, relating to special bids, have either been sustained by the courts or have received the sanction of long practice unchallenged. There is not much doubt that each by itself constitutes a lawful trade agreement.

<sup>4</sup> *Cement Mfrs' Assn. v. United States*, 268 U. S. 588 (1925).

<sup>5</sup> Upon this point the two cases do not appear in entire agreement. In the Cement case, in respect to a large portion of the business of members, it was held permissible. In the Maple Flooring case, the Court mentions the fact that the defendant association had abandoned the detailed specification of data as a factor supporting the judicial view of the legitimacy of its activities. The holding in the Cement case appears to be more authoritative.

<sup>6</sup> Typical of the rapidly developing organizations of this type are the American Petroleum Institute, the Cotton Textile Institute, and the Rubber Institute.

But considering them in conjunction with the other parts of the scheme they may take on a different color.<sup>7</sup> Likewise, the compilation and distribution of such trade statistics, as in this particular case are given wide publicity, may be taken upon the authority of the *Maple Flooring Association* case to be a legitimate coöperative activity. The fact that the total weekly production, sales, etc., of each manufacturer are disclosed to other members but not to outsiders, who are informed only of the aggregate of each item for the entire group, does not of itself condemn the plan.<sup>8</sup> But this feature may assume a new significance when found alongside the arrangement for reporting secretly every detail about special bids.

#### ECONOMIC JUSTIFICATION

In the last analysis any scheme such as this industrial institute embodies will stand or fall in the courts according as it has or has not genuine economic justification under the principles and within the framework of a competitive system.<sup>9</sup> Does the organization above

<sup>7</sup> *Swift & Co. v. United States*, 196 U. S. 375 (1905).

<sup>8</sup> See *Maple Flooring Assn. v. United States*, 268 U. S. 562, 573 (1925). The Court found nothing wrong with the plan of reporting the returns for each mill to the other members, but reporting only the aggregate figures to outsiders.

<sup>9</sup> That we have reached this stage of practical adaptability in the law is chiefly owing to the statesmanship of jurists on the bench, rather than to the legislative wisdom of the politicians in Congress. But that it is an actual achievement and not a mere boast is borne out by such decisions as the *Chicago Board of Trade* case, 246 U. S. 231 (1918), the *National Window Glass Association* case, 263 U. S. 403 (1923), the *Maple Flooring* case (*op. cit.*), and the *Cement Association* case (*op. cit.*), and is not in the least disproved by the *Pacific Paper Trade Association* case (*op. cit.*), or the *Trenton Potteries* case, 273 U. S. 392 (1927).

In the face of these decisions, not to mention the recent rulings upon corporate mergers, it is sheer impertinence, if not worse, to declare as does a writer whose experience should have

sketched meet this test? What are the concrete circumstances which have given rise to the industrial institute as a new expedient, or rather only a more highly developed form of an old expedient—the trade association, for stabilizing business? Do the facts afford an adequate defense for this further extension of trade coöperation in the perennial effort to prevent ruinous competition? Those who have been chiefly responsible for this new development in trade organization feel assured that they are not trespassing upon forbidden ground. They point out that manufacturers generally have several classes of customers, but usually these fall into two broad groups—dealers and manufacturing users. The former buy for distribution to consumers. The latter buy for attaching to, or incorporating in, larger or more finished products. Because the latter purchases are ordinarily made in larger volume, and frequently also because such a use of a manufacturer's product gives it a certain prestige, the producer is inclined to make some price concessions for this class of trade. But, in actual fact, we are told, he finds himself constrained by the manufacturing purchasers' unfair tactics to bid for this business on a non-profit or even less-than-cost basis. The manufacturing purchasers, it is said, not only play off the bid of one producer of auxiliary equipment or raw material against that of another, as is their recognized right and immemorial custom, but they go further and falsely claim to have bids lower than have actually been received. Without some such organization as the industrial institute which we sketched

guarded him from such a misstatement that "As now interpreted, the Sherman Law forbids all coöperative agreements no matter how good their motives or how good their results." Felix Levy, in the *Virginia Law Review* (1927), Vol. XIII, 597, at p. 609.

the primary producers are at the mercy of these manufacturing customers. They have no means of ascertaining the actuality of the alleged opposing bids they are asked to meet. There is no open market, and they must bid blindly. They are at a great and unwarranted disadvantage.

On the other hand, the primary producers are unwilling that their bids on these special orders should be made public, and they defend the reasonableness of this position. They assert that the terms of each such transaction must take into account the peculiar circumstances of each manufacturing purchaser—the reputation of his product, the volume of his business, and especially his credit, since such contracts usually run for several months or a year and require extensive commitments in advance by the primary producer who makes the sale. They declare that the plan of reporting such bids to a central office, in confidence, where their terms may be examined solely by competitors is a plain business necessity, and involves nothing more than an honest attempt to protect themselves against imposition. The plan leaves each primary producer free to submit bids for this class of business upon any terms which he may deem advantageous. It leaves each manufacturing customer free to make the fullest use of every bona fide bid he receives in negotiating his order with any bidder. There is no substitution of the collective will of the members of the institute, in respect of the terms upon which this or any other part of the business will be done, for the individual judgment of the several producers.

Such is, in outline, the case which its proponents make out for the latest development in trade coöperation for

the stabilization of prices. The issues presented clearly go somewhat beyond those disposed of in the adjudicated cases. But there is guidance to their determination in the recent rulings, particularly in the "specific job contract" features of the *Cement Association* case. Without attempting to forecast the view of the courts regarding such arrangements, it may be admitted that their distinctive features do appear to spring from a proper endeavor to meet the practical exigencies of a business situation which become more and more perplexing as, relative to the aggregate volume of production, the number of "representative producers" becomes smaller and smaller in each branch of industry. Integration is a swift and effective remedy for this trouble. But, like most medicines, there is a limit to the amount which the patient can safely absorb. The scale of proprietary business organization cannot be indefinitely extended without encountering formidable checks on the side of managerial planning and direction. Eventually these may be overcome, and if they are we shall surely find ourselves on the road to some now fanciful World Corporation or Industrial State. One is entitled to be skeptical of such visions, however, and meanwhile there remains the problem of minimizing the difficulties of running industry economically and continuously through the medium of the price system. That trade coöperation as represented in industrial institutes, organized and conducted in good faith, will assist materially in the solution of this problem seems clear. They should help to prevent those maladjustments, inconsistencies and irregularities in price movements which are the bane of conservative business and the bait of gamblers.



# The Statistical Work of Trade Associations

By THOMAS W. HOWARD

Assistant Manager, Department of Manufacture, Chamber of Commerce of the United States

THE stabilization of an industry is unquestionably assisted where the executives of that industry have available and use systematically that body of facts which have come to be known as trade association statistics. This is not an academic assertion; the experiences of representative industries have established the fact. No more convincing statement of its truth can be presented than that appearing in the opinion of the United States Supreme Court in the so-called Maple Flooring Manufacturers Association case. That statement is as follows:

It is not, we think, open to question that the dissemination of pertinent information concerning any trade or business tends to stabilize that trade or business and to produce uniformity of price and trade practice. Exchange of price quotations of market commodities tends to produce uniformity of prices in the markets of the world. Knowledge of the supplies of available merchandise tends to prevent overproduction and to avoid the economic disturbances produced by business crises resulting from overproduction. But the natural effect of the acquisition of wider and more scientific knowledge of business conditions on the minds of individuals engaged in commerce and its consequent effect in stabilizing production and price can hardly be deemed a restraint of commerce or if so it cannot, we think, be said to be an unlawful restraint or in any respect unlawful.

It is the consensus of opinion of economists and of many of the most important agencies of Government that the public interest is served by the gathering and dissemination in the widest possible manner of information with respect to the production and distribution, cost and prices in actual sales, of market commodities because the making available of such information

tends to stabilize trade and industry, to produce fairer price levels and to avoid the waste which inevitably attends the unintelligent conduct of economic enterprise. . . .

It might be expected, in view of the conclusiveness of the evidence, that there would be an avid interest on the part of business men in statistical work by their trade associations, and that every representative industry would have available for its executives, current significant statistical data, on the movements of the industry. Unfortunately, this is not yet the case.

It may be that the abundance of statistics on innumerable subjects now available may in itself be the deterrent which causes many business men to be indifferent to additional statistics. Business magazines and trade papers are full of statistics; banks supply their customers with monthly analyses of business based on statistics; numerous professional statistical agencies furnish facts and figures on countless subjects. In short, there is no dearth of figures; rather, there is a superabundance.

## EVIDENCES OF DISINTEREST

Recently the author interested himself in the matter of the Biennial Census of Manufactures. This census, which is taken by the Bureau of the Census, relates to the operations of manufacturing industries and presents such pertinent information as the number of plants constituting the industry, the average number of wage earners, the production in units, and the production expressed in value. Such a census has been taken at varying intervals for three quarters of a



century. How useful is the manufacturer finding the results of this census? Approximately thirty members of the American Statistical Association who are officers or department heads of manufacturing companies were written to learn of the use to which they put the statistics of the Census of Manufactures. Only two of the twenty-five who answered presented information as to definite use of these census statistics. The majority of the remainder reported that they found no satisfactory use for the data, and one even reported that he had never heard of the Census of Manufactures. This situation is the more amazing in that, as stated, the recipients of this letter are members of a technical organization engaged in the study of the preparation and use of statistics.

A similar inquiry addressed to the executives of one industry which now have quite complete trade association statistics likewise revealed that the executives of the industry in most cases were using the statistics indifferently.

In spite of these evidences of disinterest in and lack of understanding of trade association statistics, the more responsive and aggressive business leaders thoroughly appreciate the importance of trade association statistical movements in the ultimate stabilization of their industries. Moreover, there is no cause for a feeling that the trade association statistical movement cannot succeed, for the evidences are numerous of a growing demand for trade statistics and an increased appreciation of their usefulness.

#### CHARACTER OF STATISTICAL FACTS

What, now, are the facts with respect to the extent that trade associations are engaging in statistical activities? It is difficult to answer this question accurately in figures because of the varying extent of statistical activities of

trade associations. Here and there is an association which collects daily or weekly figures; a considerable number collect a few or many figures on a monthly basis; and then there are some that rely upon annual statistics. It is estimated, however, that more than one hundred trade associations of various kinds are regularly collecting more or less extended statistical facts pertaining to their industries.

Let us now consider the character of statistical facts collected by these trade associations. The largest single group of trade associations representing manufacturers provide statistics on some or all of the following items:

Orders received by the industry as a whole—expressed in units of production.

Actual production of the month or other period under review.

Shipments to customers, likewise.

Balance of unfilled orders at the end of the month.

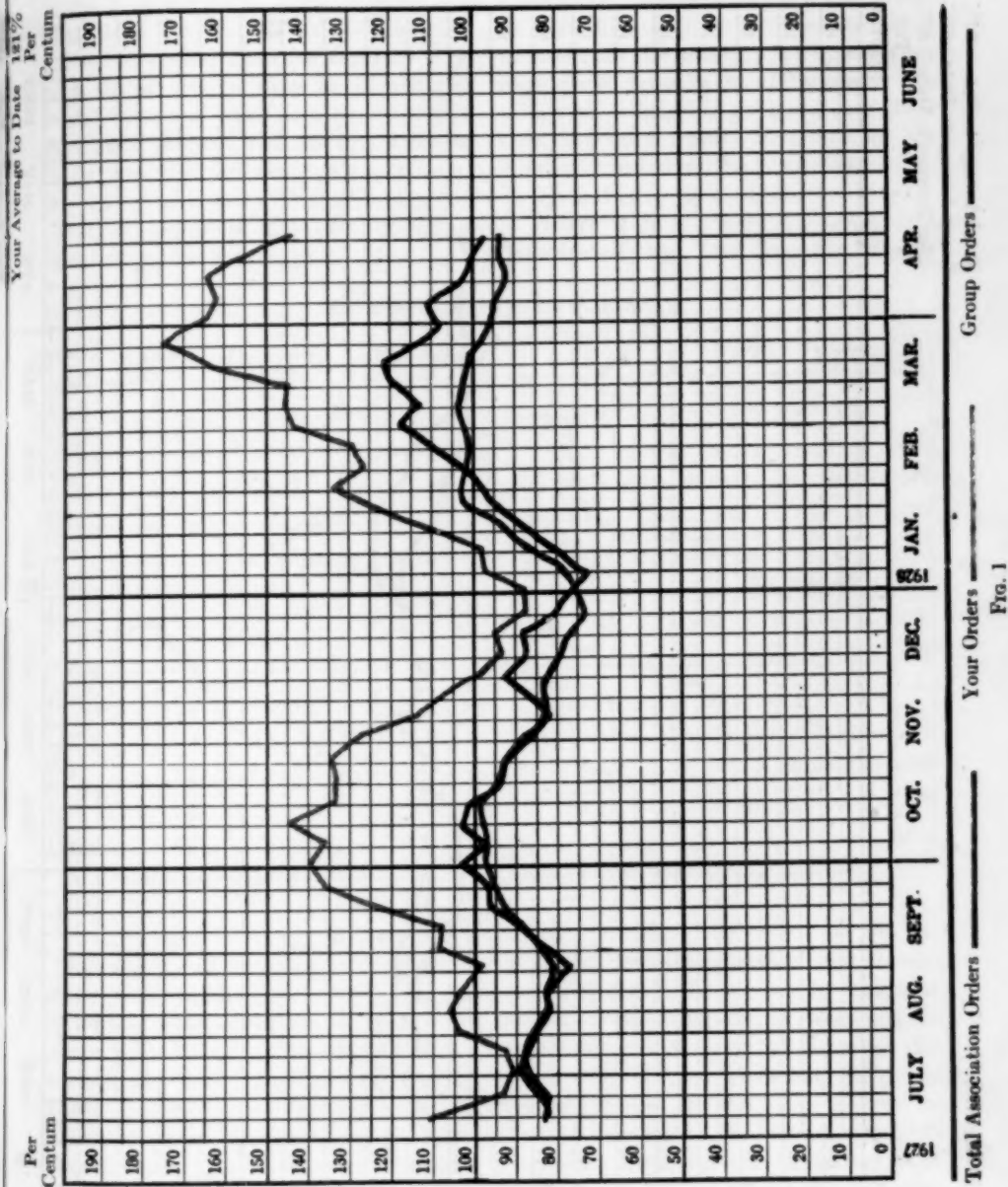
Stocks on hand at the end of the month.

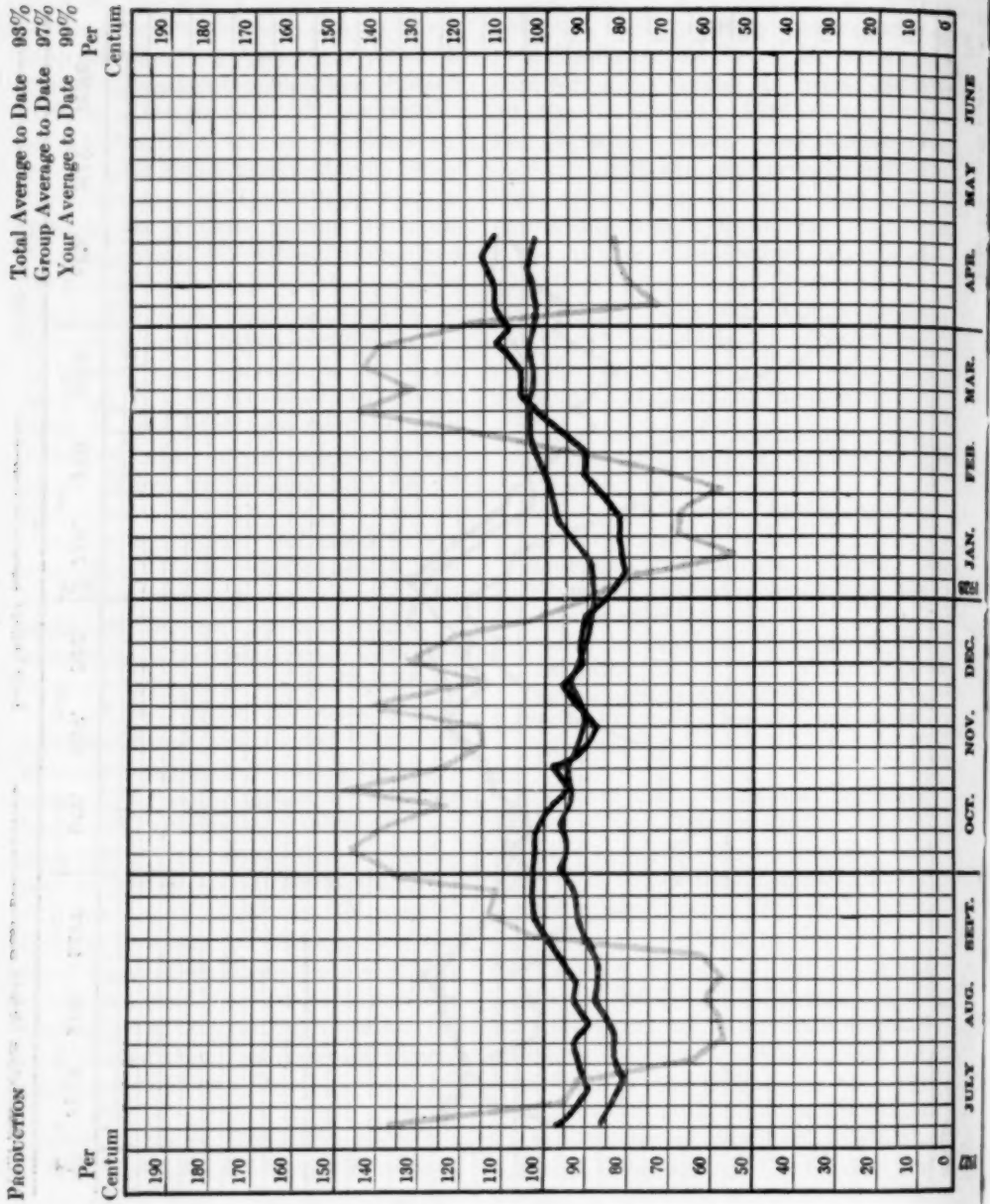
Prices in closed transactions.

Normal capacity for production by the industry.

Utility of statistics such as these are illustrated by the following:

If the manufacturing executive has these facts before him currently he can contrast the situation presented by his own company with that for the industry as a whole. If, for example, shipments by the industry as a whole have increased say 10 per cent, as compared with the past period, while his own business shows a loss of 5 per cent, he is provided with a danger signal as to the course of his own business. Again, if he knows that the industry as a whole is operating at but 60 per cent, of its capacity, while the operations of his company are at 85 per cent capacity, the statistical picture is an important one.





However, he cannot consider this fact detached from others, for it is quite possible that even though his operations in relation to his capacity are much higher than for the industry as a whole, yet he may be securing a large volume of sales as a result of the making of prices which are much below those for the industry as a whole. Or, he might be manufacturing for stock in excess of the rate of other members of his industry.

company is in that undesirable position of being called a price-cutter by his competitors, an appellation which, when he uses it himself with respect to other members of the industry, arouses within him great animosity. Obviously, his policy of selling his goods at less than cost not only results in a loss to his company but disturbs conditions within the industry as a whole.

Figure 3 is a chart prepared and distributed by the Writing Paper

## TREND OF SULPHITE PRICES

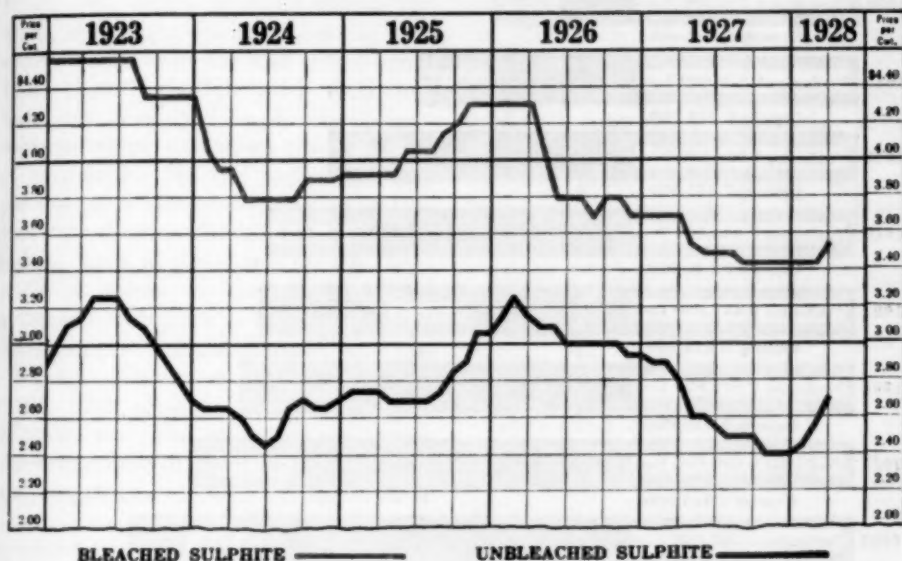


FIG. 3

Interesting illustrations of statistics shown in graphical form whereby an individual company can compare its status with that for the association as a whole are shown in Figures 1 and 2. These charts are reproductions of charts prepared by the Writing Paper Manufacturers Association for its members.

Likewise if he finds that his prices are much below those of his competitors and that as a result his company is incurring a loss, he knows that his

Manufacturers Association to its members, covering the trend of sulphite prices. Numerous other associations use this form of chart to visualize the trend of prices. Another field in which interest in statistics is keen is that pertaining to the extent to which the plant capacity of the industry is employed. Figure 4, for example, illustrates the extent to which the paper machines in the United States were employed over a period of several years in relation to their capacity for

employment. This chart, also, is one prepared by the Writing Paper Manufacturers Association, contained in one of its monthly bulletins, entitled "Market Facts."

There is no question as to the great

the executives of that corporation would insist on the prompt and accurate collection of such statistics as the foregoing. What would be good for the executives of such a monopolistic company would be equally good

#### CAPACITY AND ACTUAL PRODUCTION OF PAPER MACHINES IN THE U. S. A.



FIG. 4

utility of statistical facts such as these. Let us suppose for a moment that in a given industry all the members were merged into one great corporation. It would be a foregone conclusion that

for the executives of the independent companies. After all, the trade association, as one experienced executive points out, may be called an "industry-wide corporation."



## STATISTICAL ACTIVITIES

A few illustrations of statistical activities of trade associations of the character just discussed will now be presented.

Typical are the statistical activities of the Southern Pine Association. That organization publishes a statement known as the "Weekly Trade Barometer." This statement shows for a specified number of mills the orders on hand at the beginning of the week, expressed in terms of cars and board feet, orders received during the week, shipments during the week, and orders on hand at the end of the week. From these basic data other statistical facts are developed, such as the percentage which shipments are in excess of production for the week; and the percentage which orders are above or below production for the week. Similarly, a digest of these data for the three previous weeks is shown. Monthly, a printed statement is prepared which summarizes the statistics on the "Weekly Trade Barometer" statements and presents much additional information. For example, one table discloses stocks on hand and production and shipments for each of the several states producing southern pine. A second table reports running time for the month and data on the amount of lost time. Still another table reports exports of lumber and timber through the principal Gulf ports.

Another industry reporting somewhat similar statistical information is that represented by the National Fertilizer Association. Its monthly statements to its members show the amount of production for the month in question contrasted with the previous month and the same month of the previous year. Similar data for shipments and stocks on hand are reported.

The common brick industry has a

statistical reporting plan which reveals monthly the following information arranged according to the several geographical groups of states. New England, for example, constitutes one group; Illinois, Indiana, and Wisconsin another group. The data shown are the number of companies reporting; the number of plants closed down; the quantity of burned brick on hand; the quantity of unburned brick on hand; the quantity of brick moved from the yard during the month; orders on the books; prices per thousand brick received at the brick yard, and prices at the yard received on sales during the preceding month.

The paper industry presents an exceedingly interesting illustration of a comprehensive statistical movement. In this great industry the several branches are represented by the following associations:

Binders Board Manufacturers Association

Converting Paper Mills Association

Cover Paper Manufacturers Association

News Print Service Bureau

Paperboard Industries Association

Tissue Paper Manufacturers Association

United States Pulp Producers Association

Writing Paper Manufacturers Association

Each of these associations collects and disseminates to its members pertinent trade statistics. In turn, the American Paper and Pulp Association, which is the federation of the several self-contained associations enumerated, summarizes the statistics of the several branches and issues a monthly statistical summary. The first page of this summary is devoted to a brief, pungent statement of the outstanding facts disclosed by the statistics of the pre-

vious month. In the following pages appear detailed statistics. Page 2, for example, is devoted to the percentages of increase and decrease of the daily average production and of stocks on hand of a specified number of identical plants for the month in question as compared with the same month of the previous year. In this connection, it is to be noted particularly that, by developing the statistics of production in terms of the daily averages of production, inaccuracies due to varying number of working days in the several months are avoided.

On page 3 appears information with respect to the rate of production expressed in terms of practical production capacity. For example, in one month the news print branch of the industry operated at 83.5 per cent of practical production capacity; the book paper branch at 91.2 per cent of capacity; and the paperboard branch at 83.4 per cent of capacity. Similarly, figures are presented for other branches of the industry.

The fourth page of the bulletin presents comparisons for a four months' period with the same period of the preceding year.

The fifth page shows statistics for a specified number of identical mills on the physical volume of production, percentages of capacity, and shipments and stocks on hand in physical units for the month in question and two preceding months.

These statistics are also supplemented by charts which present the statistical picture clearly for a considerable period of years. These basic charts are, in turn, supplemented by monthly charts which accompany the statistics previously described.

Usually, statistics collected by trade associations of the type illustrated by the foregoing are given wide publicity. Many trade associations forward their

reports to the Bureau of the Census where they are assembled and published monthly in the Survey of Current Business. This publication is available to anyone wishing to subscribe for it.

The statistics to which attention has been given up to this point are obviously those the executive can employ in his guidance of the course of his business, as it relates to the physical facts of production. There are some industries for which statistics of this kind are not of common interest. For example, an executive of a retail hardware business is usually not especially interested in the trend of retail sales for the country as a whole. He is, of course, interested in trends of trade in the territory in which he distributes his goods, but, with few exceptions, the gathering of trade statistics for such limited areas is not practiced. In an industry such as the retail hardware industry the national trade association, however, can render service in collecting and disseminating statistical facts bearing upon the efficiency of operation of hardware businesses of various sizes. The National Retail Hardware Association, in fact, recognizes the usefulness of such statistics and for many years has been receiving from its members itemized reports on the costs of doing business and other collateral data. These statistics are compiled and a printed pamphlet prepared and issued to the members of the association. A study of the facts thus disclosed should be of unquestioned value to the intelligent retail hardware executive.

#### MORE ELABORATE SYSTEMS

The trade association of employing printers, the United Typothetae of America, has a more elaborate system of statistical procedure along the same lines. That organization, national in scope, has a considerable number of

subsidiary organizations in the large printing centers of the country. For example, there are such organizations in New York, Baltimore, Washington, Cleveland and Chicago. As is generally well known, the United Typothetae of America has developed a uniform accounting and cost finding system which is in extensive use. Monthly, members of the organization prepare and send to their local subsidiary, statistics pertaining to costs and production. These statistics are compiled in the local office and a summary statement returned to the members supplying information. These summarizations show such facts as operation costs for type setting, for printing, for binding, and production facts on the efficiency of operation of the mechanical equipment. Through these statements the individual printer can compare his experience with that of the trade in his territory.

Yearly, also, the United Typothetae of America collects statistics for the country as a whole and prepares a publication known as "Ratios for Printing Management." One of these pamphlets reveals that statistics have been compiled from the balance sheets of 353 printers, statistics of operation from 367 printers, and cost statements from 222 printers. To show the volume of business covered, the 367 plants employ 9,222 workers in their mechanical departments and have an annual sales volume of nearly 50 million dollars.

Among the statistics shown, for example, are composite profit and loss statements and balance sheets, and, in parallel columns, the actual figures of a printing concern that is set forth as an example of inefficient management. By way of illustration, the gross sales of 111 plants coming within Class "C" (Sales from \$35,000 to \$75,000 per year) were \$52,278.53, while the sales

for the printer whose case is analyzed were \$40,271.77. Then follow all of the items on a conventional profit and loss statement and detailed items, such as rent, insurance, taxes, wages, etc., until the last figure is reached: namely, the net profit or loss for the period, which in the case of the 111 concerns amounted to 4.97 per cent of the net sales, while the printer, whose figures are given, showed a loss of 2.94 per cent. Inspection and study of these figures by any printer whose business comes within the limits of the net sales for the class must be highly profitable.

The news print industry, previously referred to, has a very complete reporting plan of statistics pertaining to the efficiency of operation within the plants. The comparative conversion costs which are exchanged through the Bureau begin with prepared wood, the cost of the wood itself, however, not being included. These conversion costs are divided about as follows:

Cost of converting prepared wood into mechanical pulp.

Cost of converting prepared wood into chemical pulp.

Cost of converting mechanical and chemical pulp into unfinished paper.

Cost of finishing.

Cost of manufacturing stem per 1000 pounds.

When the exchange of these conversion costs commenced, wide variations were shown and the spirit of emulation to reduce costs soon developed. In order to remove the doubt as to the accuracy of these reports, expressed by mills whose conversion costs were high, it was necessary to develop records which indicate operating efficiency along the following lines:

Paper machine efficiencies which included pounds per inch of width on machines. Machine speeds,

per cent of trim, time lost from various causes, broke losses, etc.

Machine equipment statistics giving such items as tons of paper per square foot of wire surface, tons of paper produced per pound of felt, etc.

Efficiency records of this kind naturally give direct comparisons which conversion cost failed to give because of the varying prices of the material and labor in different parts of the country, especially between the United States and Canada.

Steam plants efficiency reports, including evaporating records, etc., made in accordance with the American Society Mechanical Engineers' standard practice.

Moisture tests in the sheet of finished paper.

As a single illustration of the increased operating efficiency resulting from the collection of these statistics, reference may be made to the cost of steam as employed by news print manufacturers. Steam costs represent about 40 per cent of the conversion costs of news print rolls, so a saving of 10 or 15 per cent which has been made in some instances represents a very great amount.

#### AROUSING THE INTEREST OF EXECUTIVES

The usual statistical activities of trade associations having been illustrated, it is now of interest to turn to some other phases of the subject.

In the first place, the problem of interesting the business executive in the statistical activities of his trade association will be considered. Arousing the interest of the executive to the importance of the matter has seemed to some trade association officers to be an easy task. In fact, in the past, statistical movements have been established on the assumption that when the

figures were available the members of the industry would take to their use as a duck takes to water. We have come to know that the problem is a fundamental and difficult one and the chief executive of a trade association must give this problem his most careful attention. For one thing, he will undoubtedly find it desirable to arrange for the presentation of addresses at the annual conventions of his trade association on the utility of trade statistics. If the association maintains a bulletin service or publishes a magazine, the enterprising association secretary will see to it that so-called propaganda in the form of interesting stories and exhibits will be presented. A third opportunity offers through the calling of a special conference of the executives of the industry to give consideration to the importance of a statistical movement within the association. There is no one royal road to success in arousing the desire of business executives for trade association figures, but the enterprising association secretary can and will find a satisfactory method for the solution of the problem.

There are executives here and there who have allowed the bug-a-boo of illegality to deter them from coöperation in the trade association statistical movement. These executives have been unable clearly to distinguish between the legality of pure statistical activities, on the part of their trade associations, and the illegality which may follow through the misuse of the statistical machinery. However, the opinions of the United States Supreme Court now make the situation entirely clear. The following excerpts from opinions of the Court are illuminating:

First, an extract from the opinion in the so-called *Hardwood Lumber Case*:

This elaborate plan for the interchange of reports does not simply supply to each member the amount of stock held, the sales



made and the prices received by every member of the group, thereby furnishing the data for judging the market, on the basis of supply and demand and current prices. It goes much further. It not only furnishes such information, with respect to stock, sales and prices, but also reports, giving the views of each member as to "market conditions for the next few months"; what the production of each will be for the next "two months"; frequent analyses of the reports by an expert, with, we shall see, significant suggestions as to both future prices and production; and opportunities for future meetings for the interchange of views, which the record shows very important.

The court was so convinced that the purposes and activities of the association "were to restrict competition and thereby restrict interstate commerce in the manufacture and sale of hardwood lumber by concerted action in curtailing production and increasing prices," that it decided that it constituted a combination and conspiracy in restraint of interstate commerce.

Contrast this statement with the statement contained in the more recent opinion in the Maple Flooring Case, previously referred to:

We decide only that trade associations or combinations of persons or corporations which openly and fairly gather and disseminate information as to the cost of their product, the volume of production, the actual price which the product has brought in past transactions, stocks of merchandise on hand, approximate cost of transportation from the principal point of shipment to the points of consumption as did these defendants and who, as they did, meet and discuss such information and statistics without, however, reaching or attempting to reach any agreement or any concerted action with respect to prices or production or restraining competition, do not thereby engage in unlawful restraint of commerce.

Some executives also are unable to satisfy themselves that the facts and figures pertaining to their own businesses,

which they hold to be confidential information, will not become known to their competitors. In other words, there are executives who hold to the theory that they suffer an irreparable loss if their competitors become acquainted with the results of the operation of their businesses. Fortunately, however, business executives are rapidly receding from this point of view. In the first place, they now have confidence in the salaried executives of the trade associations and know that there will be no disclosure of facts and figures submitted in confidence. In the second place, business executives have come to realize that facts with regard to their businesses, even if placed in the hands of their competitors, can do them no possible harm. Witness, for example, the full publicity the United States Steel Corporation gives to all of its affairs.

#### DIFFICULTIES CONFRONTING TRADE ASSOCIATIONS

There are some difficulties that are more or less technical in character confronting trade associations in connection with the collection of statistics. For example, there is a question as to the value of statistics for an industry or trade which does not represent the whole or a very large part of the industry; and when it is remembered that not infrequently trade associations do not include in their membership all of the units of the industry, and of those who are members some fail to coöperate because of reasons sufficient to themselves, the statistics for the remainder may present an unsatisfactory picture.

Statisticians now recognize, however, that it is not at all necessary to have the figures of every member of the industry in order to provide a satisfactory statistical picture of the trend of operations. Not infrequently has it been found that statistics covering not



more than 60 per cent of the volume of the industry present an adequate picture of these trends. Of course, it is desirable to enlist every member of the industry in the movement, for unless an executive is contributing the facts in regard to his own business to the common pool of information, it is not likely that he will take the interest in the resulting compilation that will enable him most satisfactorily to make use of the results.

Again, in the case of some industries there is difficulty in selecting a satisfactory statistical unit. For example, if the machine tool industry as a whole is considered for statistical purposes, with members of that industry making a wide variety of products, the only statistical unit now available is the dollar—indeed an uncertain unit.

Finally, there are difficulties in the technique of tabulation and presentation of the statistics. Not a few trade association movements in the field of statistics in the past have failed because of the inability or inexperience of those in charge of the work to set up the statistical data in an interesting and convincing manner.

While these difficulties are real they are not insurmountable and some trade association executives have found the desired solution through the calling of a conference of members of the industry for the joint consideration of the problems, technical and otherwise, attending the establishment of the desired statistical machinery.

#### NEED FOR STANDARD PROCEDURE

There is an obvious need for the standardization of the statistical procedure of trade associations. This has been recognized particularly by those who have wished to make comparisons of statistics for various industries and have found that the nomenclature and statistical procedure are lacking in

uniformity between associations. The proposal for standardization has now taken form through the agency of the American Engineering Standards Committee. That committee has requested the American Society of Mechanical Engineers to sponsor the movement. In turn, the American Society of Mechanical Engineers has created a Study Committee to undertake the actual project of standardization. Such organizations as the American Economic Association, American Trade Association Executives, the National Electrical Manufacturers Association and the National Industrial Conference Board are among the 28 similar agencies that have been enlisted in the work.

Several sub-committees have been created and have commenced their studies. The Sub-Committee on Terminology, for example, has progressed to the point in its work of presenting tentative definitions of the following:

Inquiries and projects	Shipments
New Orders	Trans-shipments
Cancellations	Stocks
Net New Orders	Production

The progress made is substantial and is an indication of what may be expected to follow.

#### GENERAL CONCLUSIONS

What general conclusions may be reached with respect to the trade association statistical movement? In the first place, the substantial value of trade statistics in the movement for the stabilization of industry has been established. In the second place, a sufficient number of industries is engaged in actual statistical work as to prove the practicality of the procedure. Moreover, the bug-a-boo of illegality has been definitely removed by the opinion of the United States Supreme Court in the Maple Flooring Case.

What does the trade association statistical movement now need? Of first importance is the need for the acceptance by business executives generally of the usefulness of the trade association statistical movement. They must come to see that competition in many lines of industry is unintelligent or unformed, as some prefer to express it; they must appreciate that in many lines there is excess capacity for production accompanied by stagnated

distribution and that profits of the industry are at the vanishing point. In the face of these situations they must accept beyond the question of a doubt that one of the greatest services a trade association can render is the operation of a simple but effective statistical procedure. Progress in this direction, though slow, is constant, but promising, indeed, is the future of the trade association statistical movement.

# The Statistical Work of the Federal Government in Relation to Price Stabilization

By MORTIMER B. LANE

Editor, *Survey of Current Business*

**P**REVIOUS to the World War the statistical work of the Federal Government was concerned largely with the census returns and other data compiled at rather long intervals. These figures were compiled with scientific accuracy, but upon publication were looked at as historical records, not as up-to-date helps for the business man. The World War changed this picture. The business men called to Government service needed up-to-the-minute statistics in arranging for the production and distribution of supplies to our troops and to the overseas populations that were depending upon the United States for food, munitions, and other supplies. Stabilization of domestic prices of many commodities was also sought.

The close contact formed between business men and Government statistical workers under stress of war conditions has never been lost and in fact has constantly increased. Business men began to see that they could find a wealth of material in the Government's statistics to aid them in establishing business policies which would prevent undue losses and stabilize their business. Government statisticians also found that through contact with business men their statistical product could be improved for service to the business man as well as to the economist or historian. Among the concrete examples of this kind of work were the inauguration by the Federal Reserve Board, shortly after the war, of current statistical indicators in the Federal Reserve Bulletin, the large increase in the num-

ber of current farm figures made available by the Department of Agriculture and the establishment in the Department of Commerce of the *Survey of Current Business* in 1921. It is not necessary to describe all of these additions to the statistical work of the Federal Government, as the general principles involved and results of their work are very similar. The *Survey of Current Business* will alone be taken for description since it covers the widest range of territory and includes not only data compiled by its own department but from a wide variety of sources not only in the Government but among business organizations.

The *Survey of Current Business* was instituted by Secretary Hoover shortly after he became Secretary of Commerce in 1921. At that time the United States was in the midst of widespread depression. Business men, labor leaders, economists and public men generally were trying to find ways out of the condition of extreme inactivity which had fallen upon the country. Studies showed that this depression was the aftermath of the post-war boom starting in the latter part of 1919 and continuing through the early months of 1920. It was further seen that knowledge of the actual facts of business at that time might have led to saner programs of buying instead of to the rampant speculation which prevailed as long as people thought that any purchases could be soon resold at a nice profit, as was the case when commodity supplies were low. Secretary Hoover not only needed statistical data for his

own guidance but he believed that the Department of Commerce could render a valuable service to business men by providing a medium for the collection and prompt dissemination of all available current facts on the business situation, to aid the individual business firms in basing their policies upon facts and to stabilize business in general through proper coordination of production, prices, stocks, etc.

Starting with a small mimeographed folder listing about 200 of the more important items then available, the *Survey of Current Business* has grown since 1921 until now about 1700 items are published regularly for the information of business men. As far as possible, items are collected from outside sources. For the February, 1928, issue of the *Survey of Current Business*, data were supplied by 46 Government agencies, by 111 commercial and trade associations, by 36 technical periodicals and by 44 private companies. In addition to the figures made available from time to time from other sources, the Department of Commerce, through the Bureau of the Census, offers its facilities for the collection of information on industries where no other organization is available to compile these data or where the membership of a trade association is too small to present a representative picture of the industry. This collection of figures for individual industries is only undertaken, however, where practically the entire industry pledges its cooperation in reporting their data confidentially to the Bureau of the Census each month for combination into totals for the industry. The demand for such figures has grown from year to year and data have been added constantly as industries have seen the results which other industries obtained in increasing or stabilizing their business through accurate knowledge of conditions in the industry. As a result

of this demand, the number of industries upon which the Bureau of the Census collects current data and whose statistics are published in the *Survey of Current Business* amounted to 48 at the beginning of 1928. With few exceptions the collection of all these data were commenced after the middle of 1921.

#### REQUIREMENTS FOR CURRENT STATISTICS

In securing the monthly data for publication in the *Survey of Current Business*, whether directly from manufacturers or from compiling organizations, the Bureau of the Census attempts to have the data fulfill certain requirements, in order that the figures may be understandable and comparable with other industries. These requirements may be listed as follows:

(1) As many as possible of the standard data usually collected by trade associations should be included, so that all phases of the industry's activity may be studied in the light of facts. The standard data include new orders received during the month, production during the month, shipments during the month, stocks at the end of the month and unfilled orders at the end of the month. All associations and organizations do not collect figures on all these items but the tendency is to add the remaining items later, so that significant relationships may be discovered.

(2) Standard terminology should be used, so that the reports on different industries may mean the same thing. The term "sales" has commonly been used in some industries to mean orders as received while in other industries it has meant "shipments." The Bureau of the Census has been represented upon the subcommittee on terminology of the sectional committee on graphic presentation, which has just made a re-

port on statistical terminology with the view to its general adoption.

(3) The data should be representative. If possible, the reports should include 100 per cent of the industry, but this is not always possible, particularly in the case of industries with a large number of firms. In most cases 70 to 80 per cent of an industry will show the trend in a representative manner and this will be sufficient for the purpose of analyzing conditions in the industry, since absolute accuracy is not so essential in these frequent and quick reports.

(4) The data should be comparable from month to month. If it is not possible to obtain reports from identical firms each month, some method of prorating to a common level is used to secure comparability. Where each firm has a capacity rating or some other measure of normal production, this prorating is done by the associations themselves, but more often their raw figures have to be prorated by the Bureau of the Census before publication in the *Survey of Current Business*.

(5) The reports should be compiled promptly. Speed is essential in these reports since they intend to show present conditions, not past history. The Bureau endeavors to have the reports sent in from 10 to 15 days after the end of each month, though in some industries 30 days or so often elapse before the complete reports are ready. Such late reports are handicaps to the industries concerned and business men will often arrange to have their figures reported earlier when their attention is called to this matter.

(6) Wherever possible, a short description is given in the semi-annual issues of the *Survey of Current Business* of the particular data in question, by whom compiled, exactly what is included, how many firms report, approximately what percentage of the

industry is covered and what, if any, computations, such as prorating, have been made to the original data.

(7) Weekly data are recomputed to monthly figures. Usually the overlapping weeks of two months are prorated between the months according to the number of working days of the week falling into each month. Many associations, however, use four- and five-week periods but it is then difficult to compare the four-week with the five-week months.

#### PUBLICATION OF CURRENT STATISTICS

In the *Survey of Current Business* no effort is made to interpret or prognosticate. The figures as collected from the various organizations are presented in tabular form and there is also given a summary text, while the more important data are put up in the form of charts. Twice a year monthly averages are presented, extending back to 1913 where available, together with the monthly figures for the past two years, and complete descriptions of sources and methods of compilation of each. In the intervening months, data for the most recent periods are shown with percentage changes calculated from the previous month and the corresponding month of the previous year, as well as cumulatives for the year to date and the percentage change of the cumulative from the corresponding period of the previous year. These issues also include the regular text and chart features.

While the monthly issues give a well-rounded and complete picture of the business situation, it was soon found that they did not reach business men quick enough for prompt action. This was due to the great variation in the time of receipt of the various items, as well as in the time necessary to print complete copies of the monthly issues. Weekly supplements to the *Survey of*



*Current Business* are now issued giving all the monthly figures received by the Bureau of the Census during the previous week, and also, on the first page, a chart presenting the weekly curves of some of the principal business items for which weekly statistics are available. Thus the business man obtains not only the monthly figures as soon as they can be received and printed but also the latest weekly information in such form as to enable him to obtain a bird's-eye view of the situation.

A further service to the business man in the presentation of statistical data was inaugurated with the *Record Book of Business Statistics*, the first section of which was published in 1927. The *Record Book* is designed to present comparisons with the current figures in the *Survey of Current Business* by extending the data back to the pre-war period month by month wherever available, with complete description of sources. In many cases, data from several sources have had to be combined and recomputed to obtain a comparable series of figures. Thus the business man or economist wishing to compare the trend in principal industries over a period of years can find these data, except for the very latest figures, in one place. The first section of the *Record Book of Business Statistics*, consisting of 48 pages, covers textiles, while the second section, printed in 60 pages, presents statistics for metals and machinery. Other sections are in course of preparation and will be issued from time to time.

A system of mimeographed press releases is also employed to disseminate quickly the statistics gathered directly by the Bureau of the Census from individual concerns, as well as the monthly composite index numbers and a weekly summary on business conditions. These statements are used extensively by the press, the last two

being most useful to the general and financial newspapers while the special industry releases are especially valuable to the trade papers covering those industries.

#### INDEX NUMBERS

While the changes in individual businesses, as shown by the statistics of production, prices, stocks, etc., obtained through current statistical reports of the industries involved, are a good guide to the conditions in the respective industries, they do not furnish enough background for the ascertainment of general conditions. General conditions usually have an important influence on most industries. The business man, therefore, is not content to see that his own firm's situation is all right and that his particular industry is on a sound basis, but he also wants to see that general conditions are sound. If general conditions are not sound, it is only a question of time before the buying power of his consumers will be affected, unless some other special conditions intervene. When severe depressions come on, as was the case in 1921, all industries are affected sooner or later and the executive who can foresee this situation will be forearmed and have his preparations made to withstand the expected attack when it reaches his own industry.

In order to provide a mirror of general business conditions, the composite index number has been developed. Such an index number was first prepared even before the World War by the Department of Labor in regard to the price situation. As the trend of prices of various commodities between two successive months may be vastly different, the general trend cannot be seen by merely showing the number of increases or decreases. This is especially true since some of the more-important commodities will have a much

greater effect on the general price level than a score of minor commodities. To form the composite index number, the prices of the various commodities are weighted according to their relative importance and then combined into the final figure to show the general price level. The composite index number had been used almost exclusively for prices until 1922. This was due largely to the fact that prices were easier to secure and current data on production, stocks, etc., were not available on a sufficient number of commodities until after the war. In 1922, however, both the Federal Reserve Board and the Department of Commerce began the publication of composite indexes of production of various kinds and the former also published indexes of various phases of retail trade. The Department of Commerce, through the *Survey of Current Business*, also started indexes on commodity stocks and unfilled orders which, while not as comprehensive as the production indexes, owing to lack of material, still represent very well the trend of these items.

The production index of the Department of Commerce includes manufacturing production and raw materials. The latter index is divided as between minerals, crops, animal products and forest products. In each of these indexes it has been found possible to secure data on a representative number of commodities. The manufacturing index represents directly about 40 per cent of the manufacturing production of the United States, including the industries that have the most fluctuations. The raw-material indexes are even more representative and, as a rule, cover over 80 per cent of the groups concerned. It is thus possible to ascertain the movement of production in general and see how active industry is month by month.

The indexes on stocks and unfilled

orders have been used to great advantage in connection with the manufacturing production index. The index of stocks on hand shows whether industry as a whole is overloaded with surplus commodities. This overloading was clearly evident in the statistics for 1921. Since 1923 the index of stocks has increased rather continuously, but it has done no more than keep pace with production, except at certain periods, notably in the middle of 1924 and the latter part of 1927, both of which were periods of mild depression in which the rise in the stocks index over production showed that the supply of commodities was above immediate requirements. The index of unfilled orders shows what work has been ordered in advance and in previous years has given a very good indication of the subsequent course of the production index. Lately, however, owing to prevalence of hand-to-mouth buying, unfilled orders have shrunk to a point far below their previous level and are, therefore, less of an indicator of the trend of production.

### RESULTS

That the publication of these statistical data through the *Survey of Current Business* and other media is actually accomplishing results in the stabilization of prices may be shown in several ways. Probably the most important manner in which the results of their use is indicated is the direct testimony of those using the figures. For this purpose there are quoted herewith three concrete illustrations taken from the booklet recently published by the Department of Commerce on *How to Use Current Business Statistics*:

A building-supply company, in negotiating for its yearly contract for cement in 1924, was quoted an increased price by a salesman who stated that the supply of cement was low and urged that a quick purchase be made before a shortage developed with

spring building operations. By studying the business statistics as presented in the *Survey of Current Business*, the purchasing agent of this company discovered that cement stocks were 1,500,000 barrels higher than a year before and that prices seemed to be on the decline. He furthermore ascertained that, with a surplus of over 300,000 idle cars at the end of 1923, as against a shortage of 68,000 cars the year before, the railroads could easily deliver his goods promptly should he suddenly require a larger supply later on. These facts enabled the company to save 30 cents a barrel on a large order of cement and, through such study of statistics, it has saved thousands of dollars annually, according to the purchasing agent.

A sugar-refining company regularly studies the data on imports, exports, and meltings of sugar to determine the probable consumption and adjusts its purchases and sales policies thereto. By August of 1925 these statistics had so definitely indicated the trend for that year that the company was enabled to forecast the unprecedented consumption of sugar while the year was little more than half over, so as to take full advantage of its opportunities for increased sales.

A firm of leather exporters formerly had to spend a great deal of time learning about the leather market through interviews, etc. Now, they can see the situation at a glance through the leather statistics as presented in the *Survey of Current Business*. The results have included not only a great saving of time but, even more important, savings from 2 to 4 cents per foot on leather transactions during the past five years through actual knowledge of market conditions.

The second testimonial of the results of such figures is the increase in the number of figures themselves. New trade associations are constantly being organized, and among their first endeavors is listed the collection of current statistics on the industries concerned. Associations which have not previously collected statistics have seen the benefits to other associations of the statistical data and have joined the

band wagon to secure the same benefits for their own industry.

Another testimony to the beneficial use of these statistical data is the increased use of current Governmental statistical reports by trade and commercial papers. The trade papers not only quote statistical data on their own industry but also on related industries and on general business conditions. Most daily newspapers carry the weekly summary of business conditions compiled by the Department of Commerce.

A fourth testimony is the use made by business forecasting services of data collected by the Government on current business conditions. The *Survey of Current Business* is used as a source book by many of these forecasting services, who make computations from the data in the *Survey* and interpretations thereof for the use of their readers.

Still a fifth testimony is the increased use of these statistics by universities in classes of business administration and in bureaus of business research, where statistical collections like the *Survey of Current Business* are used as source books for instruction and for laboratory work in statistics.

The more even course of business has been very evident since 1923, when the report of the Committee on Unemployment and Business Cycles of the President's Conference on Unemployment was published, emphasizing the need for statistical data in the control of business policies and citing numerous instances from the late depression of the advantages of stabilization through use of statistics. It is not contended that statistical data are alone responsible for this, but they have provided the basic facts from which business men, following not only the course best for their own business but also for general business, have acted in a way to stabilize prices. The price level particularly has moved within a fairly nar-

row range and the changes therein have not been sudden.

Business men have often asked for suggestions as to how current statistics may best be used in their business. A compendium of the uses of such figures, gathered through contact with business

men, with suggestions as to the meaning of the statistics, has been prepared by the Department of Commerce to help business men use the statistics to the best advantage. This publication, entitled *How to Use Current Business Statistics*, has just been published.

# Economic Effect of Simplification in the Paving Brick Industry

By E. L. BELLER

Secretary, National Paving Brick Manufacturers Association, Chicago, Ill.

EARLY in the year 1921 there was an expressed conviction on the part of some of the larger manufacturers of vitrified paving brick that material reductions in production and selling costs could be effected if the number of sizes and styles of their product were universally curtailed.

It was at this time also that the Department of Commerce of the United States, under Secretary Hoover, was inaugurating its campaign to encourage the elimination of waste in industry.

Under the auspices of the department a conference of paving brick manufacturers and consumers, as well as members of the various branches of the engineering profession, was called on November 15, 1921, for the purpose of determining the areas of standardization possible.

This industry was the first of many to work out its elimination of waste problems under the then newly organized Division of Simplified Practice.

In preparation for this conference, the National Paving Brick Manufacturers Association made a survey of the shipments of every manufacturer in the country then known to be making vitrified paving brick. The data secured covered all shipments for the seven year period 1914 to 1920 inclusive. The results of this survey disclosed a total of sixty-six styles and sizes of paving brick produced and shipped during that period.

The ratio of the shipments of any one variety to the total for a single year was interesting, as well as extremely

variable. One variety alone constituted 38.8 per cent of the total, while others constituted less than .005 per cent. A careful study of the percentages of these varieties to the total, as well as a consideration of the trend of each variety over the seven year period, justified the elimination of fifty-five of these varieties and sizes, leaving eleven "standard" or "recognized" varieties.

There was established at this time a "Permanent Committee on Simplification of Variety and Standards for Vitrified Paving Brick of the Department of Commerce," the personnel of which consisted of a delegate from each of the various organizations representing in turn the producer, consumer, engineering profession and governmental departments.

Little difficulty was encountered in securing the adoption of these recognized varieties by the majority of the manufacturers, although it has never been possible to secure a hundred per cent cooperation in this standardization effort.

Subsequent annual meetings of the committee, preceding each of which a complete survey of the industry has been prepared, have resulted in the following further reduction of recognized varieties and sizes:

<i>Revision</i>	<i>Varieties</i>
1. March 27, 1922.....	11 reduced to 7
2. March 27, 1923.....	7 reduced to 6
3. March 28, 1924.....	6 reduced to 5
4. March 20, 1925.....	5 reduced to 4
Reaffirmed	
April 1, 1926.....	4 remained at 4



5, March 31, 1927.....	4 increased to 5
Reaffirmed	
March 22, 1928.....	5 remained at 5

It will be seen from the foregoing table that this program of simplification has been elastic in that in one instance it has increased the number of recognized varieties in compliance with the demand. The steadily increasing demand for the 2½-inch brick brought the shipments of this variety from 1.8 per cent of the total shipments in 1916 to 14.1 per cent in 1926. Therefore, at the meeting held in March, 1927, it was decided to reinstate this variety, and the further increase in shipments during the year 1927 to 20.4 per cent fully justified this action on the part of the committee.

It may also be of interest to state that the annual surveys, of which seven have now been made, have never represented less than ninety-eight per cent of the industry.

The extent to which these recognized varieties have been adopted by the industry as a whole may be best illustrated by the following table showing the ratio of the shipments of the recognized varieties to the total shipments for the last several calendar years:

1927.....	79.6%
1926.....	65.5% (+14.1% for reinstated variety)
1925.....	74.2%
1924.....	84.4%
1923.....	80.2%
1922.....	84.1%

In considering the above figures, it must of course be borne in mind that of necessity there must be some deviation from the manufacture of recognized varieties during a period of years. This departure is brought about by the demand for brick for repairing existing pavements, in which instance it is necessary to supply brick similar to those which are to be replaced.

A comparison of manufacturing data for a group of manufacturers who ac-

cepted simplification, and a group who did not, show that for the years 1923 and 1925 (later data not being available) the average selling price per thousand brick manufactured by non-acceptors was 9.7 per cent higher than that of the acceptors.

The benefits accruing to the manufacturer who adheres to the simplification program are many. Production processes are simplified and made more efficient. Practically no time is lost in readjustment of machinery. Employees can be trained more quickly and attain a higher degree of skill, making possible a higher quality of product and a higher wage to the employee.

Acceptors of the simplified practice in the paving brick industry, have been able to show an average brick production per man, 26 per cent higher than that of the non-accepting group, and their employees are paid a 36 per cent higher average wage.

#### BENEFICIAL RESULTS OF SIMPLIFIED PRACTICE

A survey made by the Division of Simplified Practice brings to light the following facts:

One manufacturer states that the adoption of simplified practice has reduced his manufacturing costs at least 6 per cent. If each manufacturer in the industry were to enjoy a like saving, the total as a group would net quite an appreciable amount. Ten manufacturers stated that worthwhile savings had been effected, but did not give specific figures; five had realized reductions in their inventories; three noted the elimination of manufacturing difficulties; one reported increased turnover; one lower selling costs, and one declared simplification had enabled him to make shipments in many instances direct from the kiln.

And from the same source we have

the reaction to the simplification of paving brick from different groups of consumers. Their statements in part follow:

. . . Our experience shows that a simplified list of products makes the cost less to the ultimate consumer and makes the product more readily available. Standardized sizes for paving brick are a great advantage to both manufacturer and consumer.

And,

Simplified Practice has undoubtedly somewhat simplified design and has done considerable to produce greater regularity and closer uniformity in specification requirements written by the several states

for highway work where these specifications have been effected by the simplified practice.

Also,

It is my opinion that the standard sizes adopted have worked out very well in practice and are now in general use by all highway and street paving authorities of the United States.

In this day of increasing wages and decreasing profits, wastes, no matter how slight, assume impressive proportions, and it becomes increasingly important to bend every effort to the further simplification of the processes of manufacture and distribution.

# The Relation of Uniform Cost Accounting to Competition

By C. W. HALLIGAN

Manager, Accounting Department, The Rubber Association of America, New York City

IT is exceedingly difficult to prove by any tangible evidence that uniformity of cost accounting has influenced competition, for there are so many other economic forces at work in all industries that the efforts of the accountants are somewhat obscured. Beyond any question of doubt, however, the trend toward uniform general accounting and cost accounting in specific industries and in all industries generally, has improved competition and has promoted more intelligent competition based upon a more intimate knowledge of the cost of manufacture and the cost of marketing.

One of the greatest forces that has brought the benefits of uniform cost accounting to the attention of various industries has been the work of the Chamber of Commerce of the United States, through its Department of Manufacture, under the able leadership of Mr. E. W. McCullough. Mr. McCullough's department has been disseminating information for a number of years in the form of pamphlets, holding meetings in different sections of the country and offering advice on this subject to any trade association desiring assistance in the promotion of this activity.

The need for industry coöperation in the form of trade associations usually develops when the competitive situation reaches a stage where inadequate returns upon invested capital predominate. After passing through the customary evolutionary period during which codes of ethics are formulated, statistical compilations regarding pro-

duction, sales and stocks are regularly published, and other general activities peculiar to the individual industry are discussed, the competitive situation is still in an aggravated state. Possibly the situation seems more aggravated than before, owing to lack of results after the optimistic feeling among the membership at large, when the association was formed or changed from a purely social fraternity to a business organization. When this period is reached in the life of a trade association, there is considerable groping about in the dark for some panacea which will lift the industry out of the depths and permit all to make a fair margin of profit. Naturally, the discussions at meetings drift toward costs of production. The companies with some form of cost system in operation, feeling that their competitors cannot possibly be aware of the cost of production, will try to educate their fellow members. From these discussions it will be found that even two companies in the same industry, having what each considers a good cost system, cannot make a fair comparison owing to the wide divergence of accounting methods used in the classification of the various cost elements.

## DEVELOPMENT OF A UNIFORM SYSTEM

The natural outcome of this situation is the appointment of an accounting committee to investigate the costing methods in use and develop and recommend the adoption of a uniform system of cost and general accounting

so that everyone in the industry will be talking the same language and will consider the same inclusive cost elements when quoting on competitive business. It is during this period of investigation and development that the uniform system of accounting will first have any possible effect upon competition. The industry key companies will undoubtedly assume the leadership and in comparing notes or methods used will find that the "other fellow" has some good ideas and that each company has some distinctive feature of value and at the same time is ignoring some cost element or not properly controlling wastes or expenses. In a great many instances, it will be found that quotations have been made without any regard for costs, or that no attempt is made to check actual costs against cost estimates. This development, or research, period will stimulate such interest among the accountants of companies actively engaged in the work that it cannot help but have some good influence in promoting more intelligent competition, providing other economic forces do not begot the field too greatly, such as violent fluctuations in the prices of raw material, or decided overproduction beyond the consuming power of the buying public.

#### SPECIFIC AFFECT ON COMPETITION

As a specific example of how coöperative cost research work in formulating a uniform cost accounting plan directly affected the competition in a certain class of trade in one industry, one company equipped to produce a large volume of a product had adopted a policy prevalent in the industry of attempting to fill out the production schedules by accepting orders at a slight margin over factory cost where very little sales effort was involved. In other words, those classes of ex-

penses usually included under the heading of Administrative and Selling expenses were excluded from costs when making quotations on this special class of business. Without approving this practice in times of acute competition, let us consider what happened to the company in question. From its own viewpoint, it was merely excluding from cost the two classes of expenses mentioned and was recovering by the sale its full factory overhead, plus packing and shipping expenses. Its prices were very acceptable to its volume customers and tended to pull down the margin of fair profit that other companies considered their due on this class of business, and who knew very well that their factories were at least as efficient as the successful bidder. A detailed examination of the expense classifications of this company disclosed the fact that it was not recovering even the complete factory cost as generally defined in the uniform cost accounting recommendations, or as defined by accountants in the general business world. Contrary to all precedents, this company had always taken the point of view that Depreciation of Plant Buildings and Machinery, together with all factory clerical departments, including Purchasing, factory managers and superintendents, cost accounting, laboratories, etc., were Administrative charges and should not be included in Factory Cost. This company felt that it was following a conservative policy by this procedure, avoiding the inflation of inventory values in drawing up financial statements, but, at the same time, it was not even recovering full factory cost in making sales on this basis. The education and conversion of this company to building costs on a uniform pattern certainly helped the competitive situation even though it could not entirely eliminate all the unfairness

owing to other factors entering into the picture.

#### SECURING ADOPTION

After the committee's recommended uniform accounting plan is approved and accepted by the industry in general, the task of "selling" it and securing its adoption by association membership at large begins. This is a long drawn out process requiring unlimited field work by the association staff accountant. This field work in itself helps to instill in all members the soundness of the principles advocated and to drive home the necessity of keeping as accurate costs as are possible, so as to know at least how much is lost by selling below cost when the competition does not permit a fair margin of profit. There is no legitimate excuse for selling below normal cost, although many arguments can be produced in its favor in times of stress. Mr. Charles R. Stevenson, of Stevenson, Harrison & Jordan, delivered a very interesting talk on this subject at the National Association of Cost Accountants' convention last June in Chicago. As a result of his talk, the association formally adopted the following resolutions, which if accepted and adhered to by all industries would bring about fair, as well as profitable competition:

WHEREAS, The purpose of business enterprise is service and profit in order that labor, management and capital shall be properly rewarded, and the business continued on a sound basis so that the public shall receive constantly better service, and

WHEREAS, As a result of our deliberations we are convinced that the practice of selling at or below normal cost is destructive and unfair except for the purpose of moving defective or obsolete goods:

*Be it resolved*—That we deplore this practice and urge every man engaged in business to adhere firmly to a price policy which shall yield a reasonable profit over normal cost;

That we believe the true purpose of competition is to bring about a real lowering of normal costs through greater efficiency;

That we urge every business to develop and install adequate standard cost methods so that these policies may be intelligently applied;

That we urge every man to recognize the fact that he is part of the industry in which he is engaged, that his individual success depends upon the success of the industry of which he is a part, and that whatever he does affects not only his own business but his industry;

That business exists for the service and good of the many and not for the selfish benefit of the individual.

One of the greatest advantages of a uniform costing system for an industry is the ability to make cost comparisons. Several trade associations operate such comparisons on a monthly basis, which have developed into major activities of the associations involved. The benefits derived are not those of price fixing, but of the competition in efficiency of operation that develops from such a comparison. Ordinarily, rumors and hearsay without any foundation on fact, drift through the various organizations in regard to costs of manufacture, and if comparisons accomplish nothing else but to dispel these unfounded rumors, they perform an inestimable service to all member companies and to the public. The News Print Service Bureau, an association of newsprint paper manufacturers, is an outstanding example of an industry securing the greatest benefits from uniformity of cost accounting. This association conducts a monthly comparison of the cost of converting pulp wood into paper, excluding the material and marketing costs so that by no stretch of imagination could its activities be construed as an attempt at fixing prices. This monthly exchange of costs, supplemented by numerous operating efficiency data, is based upon a



uniform classification of accounts contained in the association's manual, which has been universally adopted by all companies in the industry, so that all figures are comparable and every member is talking the same language. These comparisons are now, after seven years' operation, a fixture in the newsprint paper industry and are veritable score cards registering monthly the results of the competition in efficiency going on among the association members. Such an activity could not help but promote fair competition, giving life to the strong and death to the weak.

The Rubber Association of America, composed of manufacturers of all classes of rubber goods, has progressed in its accounting through all the evolutionary stages previously described. The accounting committee has available for members' use several publications of merit—"A Manual of Accounts," which deals with the general accounting classifications, completely describing the allocation of all expenses and their distribution; a plan for budgetary control, illustrated by hypothetical examples; a "Cost Accounting Standard Practice" manual, which provides a definite plan of cost accounting for practically all rubber products. Although considerable missionary work remains before all members can be said fully to have accepted and adopted the accounting committee's recommendations, an enormous amount of good has accrued by the publication of these manuals and the personal contact by the association staff with individual members at their plants and at cost conferences and committee meetings. Owing to the multiplicity of products and sizes and styles and different methods of manufacture, no periodical comparisons have as yet been made, but numerous conversion cost studies have been compiled which have

had an intangible effect toward more enlightened competition. They have at least called attention to the cost angle and the many possibilities for overloading one class of product with an unjust proportion of expense and giving the benefit to another class, without realizing that the variance was due to cost accounting methods rather than an actual difference in cost. This possibility is apt to have a decided influence in cases of keen competition, for a company may actually believe its low quotation was warranted by low cost when, if the uniform accounting plan had been followed, giving an equitable distribution of cost to all products manufactured, a loss may be the result rather than the theoretical profit calculated in the cost estimate.

#### NEED FOR UNIFORMITY

Behind the need for uniformity of costing in any industry is the crying necessity for proper costing itself and an appreciation of the benefits obtained from it. In the first place, cost accounting is sometimes classified as merely non-productive clerical work, a necessary evil that every business must have to a lesser or greater extent according to the whims of the particular management involved. This attitude is especially evident in companies owned and managed by executives who have passed through the era when large profits were made without the aid of any cost system, or in spite of an existing system. These profits were available simply because the competition was not very keen and prices did not have to be made close enough to warrant the employment of a staff to calculate minutely the costs of production and distribution. This attitude is decidedly antiquated today, for those same executives probably did not believe any more in insurance against fire or liability than in cost accounting,

certainly not to the extent that they believe in insurance today. The cost of cost accounting, with certain limitations should be considered in the same category as an insurance premium, or the cost of installing a sprinkler system, for with an adequate cost system quotations will be based upon something more than mere guess work and intuition, and information will be available to assist foremen, superintendents and managers to keep waste losses to a minimum with greater facility than without proper records, thus serving as a form of insurance against excessive loss.

After all, there is no such thing as an absolutely accurate cost. There are too many variables, distributions, prorations and outside economic factors to permit such a result, but a cost can be calculated with a very small degree of inaccuracy which will be of material benefit in the operation of the business. The modern cost system, as most present day accountants and executives are commencing to believe, considers only the normal cost—that is, the average cost over a business period based upon normal production. Naturally, where a company is justified in expecting an increased volume of business, there is likewise some justification for figuring on a reduction in the cost per unit on the fixed portion of their overhead. An adequate cost system will enable a company to make these calculations with relatively little trouble, while with a poor cost system, or none at all, such calculations would be purely guesswork and not based upon any logical arrangement of facts.

The modern executive demands more of the accountant, particularly the cost accountant, than ever before and the past attempts at cost keeping have failed in the eyes of these executives because the past historical cost results, disclosed about a month after the events occurred, were long forgotten and if

poor operation were evident, remedial measures could not be undertaken in time for their correction. Then again, the executive is looking forward rather than at the past and he desires information as to future costs predicated upon accurate information. This need is being supplied by budgetary control methods and standard, or predetermined, costs. Budgets have received wide publicity recently through the Federal and various State budgetary programs and are being followed out in every well-managed company. Standard, or predetermined, costs are a natural outgrowth from the budget idea in that costs are predicated upon the budget and they, in turn, form the basis for reconciling actual accomplishments with the preconceived budget. By a well established system of predetermined costs, adjustment percentage factors may be determined by which any unit standard cost of an article, or group of articles, can be adjusted to an actual cost. Based upon an average adjustment percentage, very accurate estimates may be made in quoting on future business.

In every industry there will be found executives who have been successful and still are successful, as well as the unsuccessful ones, who do not believe in spending anything other than probably an estimating clerk's salary on cost work. These are the people usually, be they large or small concerns, who can "bull" or "bear" a market, particularly "bear" it, if a tight competitive situation is experienced. These are the people who upset an industry and at the same time accuse their fellow industry members of unfair practices when they have difficulty in keeping their factories busy. One such company in the writer's experience, controlled by a very elderly gentleman who, at the age of 98 years, was still the active head of a very successful,

large business, believed that his plants should always operate to capacity and then sell goods without regard for cost. In fact he had no idea of his unit costs and said he did not care, inasmuch as he had found throughout his long years of experience that, if you follow the general market and take all the traffic will bear in good times and whatever you can get in poor times, your balance sheets over a period of years will disclose a handsome surplus. He had a record of some sixty-odd fruitful years to back up his assertions. His success was probably due more to his personal genius, marvelous speculative intuition and personal management of his affairs up to the day of his death at the age of 98, than the soundness of his reasoning on costs. This man was certainly a very poor prospect for conversion to the idea of keeping costs at all, much less on a uniform basis for the industry. On the contrary, another company without an adequate cost system was found selling an article at about fifty per cent of the cost of manufacturing and marketing, honestly believing the cost estimates upon which the sale was made were correct. Upon installing a cost system based upon the particular industry's uniform recommendations, this situation was corrected and it secured the same contract at a much higher figure, high enough to show a fair profit. The adjustment of this company's costs undoubtedly eased somewhat the competition on the particular class of goods involved, although in the readjustment of prices based upon a better knowledge of costs other prices were reduced so that some other manufacturers will be obliged to check up their costs and, if out of line, will be forced to drop the business or lower the cost of manufacture, or revise or install

a cost system that will tell the truth with a smaller margin of error, as did the first company mentioned.

#### BENEFITS OF UNIFORMITY

To sum up the situation, uniform accounting helps every company in an industry to think in terms of the industry as a whole; educates those without adequate cost systems as to the value of proper costing; standardizes cost methods and terminology; creates more wholesome respect for competitors by closer personal contact at conferences and from visits of the staff accountant; results in more intelligent quotations, making possible profitable turnovers for the efficient, which, after all, is the spirit of business. All these benefits may only accentuate the keenness of competition, but it is only fitting and proper that those companies unable to exist in a field of profitable competition for others are not entitled to a place in the industry.

The examples given are actually taken from various industries to illustrate that trade associations undertaking a program of establishing a uniform system of cost accounting aid and assist individual companies to understand each other better when talking costs; enable them to make truly comparable cost comparisons and, in addition, focus the attention of executives on the importance of cost accounting, and by spreading a greater knowledge of the subject to a greater number of people, a better understanding of industry problems materializes. Providing other economic factors are equalized, there is every likelihood of the effort resulting in promoting greater fairness in competition, even though the relationship may appear somewhat remote or intangible.

# Price Stabilization in Oil Through Control of Production

By W. H. VOSKUIL

Assistant Professor of Industry, Wharton School of Finance and Commerce, University of Pennsylvania

THE oil industry entered upon a severe period of overproduction beginning about November, 1926, and continuing unabated for the greater part of 1927. "On November 1, 1926, the Seminole Pool was producing more oil than the pipe lines could handle and the producers did not have the steel storage built to take care of the surplus oil, consequently some of the oil was going on the ground and down the creeks."<sup>1</sup> During this period the price of crude oil in the Mid-Continent and Rocky Mountain fields fell nearly one-half, while California prices were cut more than one-third. (See Fig. 1.) The loss to producers ran into millions of dollars, and in the older

fields where the yields of individual wells are small the price fell below the cost of production. The drastic price cuts of crude oil inevitably reacted on the price of refined products until a condition of chaos and demoralization of the entire industry ensued. Overproduction in the oil business is not unusual. The history of the oil industry from its inception to the latest crisis of 1926-27 records such periods in 1921 and 1923.

## CAUSES OF OVERPRODUCTION

Excessive production of crude petroleum is the result of several interlocking factors—geologic, economic, legal and human. Unlike coal, iron,

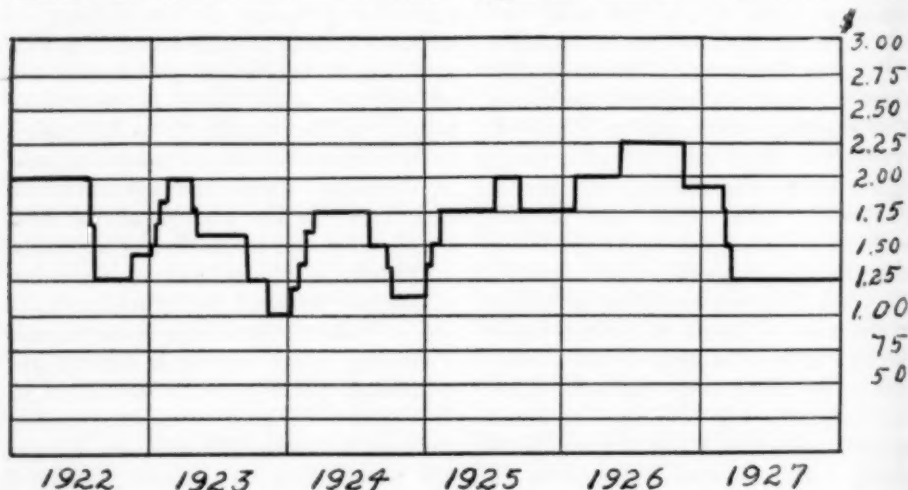


FIG. 1.—Changes in the posted prices of crude oil in the Mid-Continent Field, 1922-1927.—From *Oil and Gas Journal*, February 9, 1928, p. 139.

<sup>1</sup> "Petroleum Industry," Report of the Federal Trade Commission, 1928.



or copper, a petroleum deposit cannot be blocked out and production regulated to meet current demand. A pool, once opened, whether large or small, must be pumped until all the available oil is extracted. If the market cannot absorb the flow, storage must be provided above ground. The forced overproduction of oil is determined and intensified largely by the methods of leasing oil lands, the conditions imposed by the lease and the current practice of subdividing land holdings and leasings.

Under the ordinary terms of the usual type of oil and gas leases, the lessor is compelled to protect his lease holdings by starting drilling immediately after any wells are drilled in the sand offsetting his property. This clause, which was originally intended to protect the various landowners against the dangers of property drainage, has done much to promote the unusually expansive drilling activity witnessed in the Greater Seminole area of Oklahoma in 1926 and 1927. It could cause a similar disaster in any portion of the Mid-Continent Field, for in almost every region of that territory, the same leasing conditions exist. The lease forms used for taking oil and gas leases in the Mid-Continent Field either contain or have implied, a clause which provides for the starting of wells to protect the property from drainage by offset wells. To quote one form:

Lessee agrees to immediately offset all paying oil or gas wells drilled on wells adjoining this tract, and it is expressly agreed that no implied covenants regarding the measure of diligence to be exercised by the lessee in the drilling of said land during the original five-year term hereof shall be read into this lease, it being the express agreement of the parties that the provisions of this paragraph set forth the exclusive conditions under which the lessee shall hold this lease for said original term of five years.

If a property is divided into many small holdings or leases the conditions favoring overproduction are further increased. In the Seminole area, for instance, a few 10-acre leases did more to upset the most carefully laid plans than any of the numerous contributory causes which led to the mad rush to drill in this field.

During the fall of 1926, the Searight and Seminole pools were producing, and one Wilcox sand in the Earlsboro sector had been completed. On the south edge of the Seminole city pool, the fatal 10-acre tracts were located; and when wells were completed offsetting their lines, the owners of these leases were naturally compelled to start drilling. The very porous nature of the Wilcox formation in this field is thought to have permitted the effects of drainage to exert wider influence than in the majority of operations, and the fear that drainage would affect the leases a quarter and even half a mile from the lines of the small leases led to an insistence upon the part of royalty owners that the leases near producing properties be started immediately.

It has been estimated that over 90 wells were started as a result of small acreage tracts. The average lease in the Seminole area contained 40 acres. Many 80-acre leases were in the field, and a few tracts containing 160 acres. Had the parcels of land been larger, the fear of drainage would have been lessened due to the wider spread of leased land, and much unnecessary drilling would have been eliminated.

#### GOVERNMENT LEASES AND OVERPRODUCTION

The Federal Government is still the owner of vast areas embracing several hundred million acres of land, the title of which is held really in trust for the public generally. Within these areas



are proven oil fields and also much unexploited territory holding, in varying degrees, promise of oil in commercial quantities. All of these areas, except some special reserves, may fairly be said to be wide open to private appropriation through lease or otherwise. There seems to be no discretionary power anywhere to resist the exploitation of these lands and the dissipation of the Government's oil reserves. The leasing of the Indian lands is progressively mandatory until exhaustion.

Government leases and permits to drill require the lessee or permittee to start a well in one or in two years, even on absolutely wildcat acreage far removed from a market and regardless of general oil market conditions. At every sale of Osage lands, in recent years at least, the buyers of tracts were required by the terms of their lease to start a well within one year of the date of approval of the lease. The great Burbank Field, which was developed mainly during the overproduction period of 1923, was leased under these conditions. The result of this policy has been that, in 1927, when the country was producing probably 300,000 barrels daily in excess of requirements and West Texas was threatening to increase this excess production, the government was adding 10 per cent to the year's total production.

Finally, overproduction is largely a matter of excessively rapid development of one or a few large pools. Although there were more than 300,000 wells producing petroleum in 1927 yielding an average of 2,500,000 barrels daily, 400 wells in the greater Seminole area were producing about 350,000 barrels daily, or 14 per cent of the total output. At the same time, due to causes cited above, 467 new wells were being drilled to further swell the flood

of oil on an already oversupplied market.<sup>2</sup>

#### STABILIZATION OF PRODUCTION

The crisis in the crude petroleum industry in 1927, brought about in part by the exploitation of the Seminole area, inaugurated the movement for production curtailment with the ultimate hope of accomplishing price stabilization. On May 13 of that year W. C. Teagle of the Standard Oil of New Jersey and W. S. Farish of the Humble Oil and Refining Company declared to Secretary of Interior Work that

overproduction of crude oil, which has so often and so violently harassed the oil industry, has occurred this year in a form so malignant as to seem to be without precedent.

#### THE SEMINOLE PLAN

The above statement was followed by a meeting, at the express wish of the Secretary of Interior, of leading oil executives who initiated the movement which eventually culminated in the Seminole plan of curtailing production. A statement issued after the meeting was given which said that

the condition of overproduction of crude oil at the present time is not a local situation existing in any one particular district, but general, applying to Oklahoma, California, and Texas. Were it not for the fact that California and West Texas production is in excess of current consumption, and oil is going into storage, it is probable that the overproduction represented by the Seminole Pool in Oklahoma would have been absorbed by the industry without undue disturbance. Those present at the meeting, while owning the bulk of the production at Seminole, realized fully that the question of overproduction from the standpoint of conservation of our natural re-

<sup>2</sup> Resolution of the Okmulgee District Oil and Gas Association. Published by the Oil Conservation Board, May 27, 1927.

sources and the economic utilization of oil products, was general rather than local, and that any comprehensive plan looking to an amelioration of overproduction would not be effective if applied only to Seminole. It was the consensus of opinion at the meeting that in so far as Seminole was concerned any program adopted must be a part of the more comprehensive plan which would apply in all producing areas in which there is a prospect of large new development.

Restriction at Seminole was agreed upon as a test case and B. M. Collins of Tulsa, Oklahoma, was chosen as umpire to supervise curtailment plans. After a survey of the situation a plan was proposed by Collins which called for limiting the output of certain leases in the Bowlegs area of Seminole to a daily figure of 1000 barrels for each 40 acres contained in the lease. There were 22 wells drilling upon these leases at the time. It provided for a permitted production of 2000 barrels to each 40 acres contained in the lease for certain leases in the Earlsboro sector of Seminole. There were 49 drillings in this group. Had these wells been permitted to penetrate the Wilcox sand unrestrained, utter demoralization would have resulted. In addition to the above limitation of properties, the Collins' plan called for limiting the potential production of 113 additional wells which were regarded as "close in" operations, while 96 were wildcat wells scattered throughout a vast area south and west of the Seminole Field.

This plan, however, proved inadequate, production rising from 357,000 barrels when the plan was adopted on May 25 to 527,000 barrels in July. This unusual rise was caused by the finding of exceptional wells. Another committee under Collins was appointed and evolved a plan which limited production of the Greater Seminole area to 450,000 barrels daily and which

virtually called for a 10 per cent reduction in daily output. Under this plan the limitation to 450,000 barrels was to be in force for 60 days, the torpedo wagon was to be banished from the field for a similar period, and deeper drilling of wells was to be prohibited. There was some hesitation on the part of some companies in joining this movement for fear that the Government might act to restrain their action under the Sherman Act. After several days' study, the Oklahoma Corporation Commission ratified the action of the operators, and under an order of the commission, the proposals of the committee received official sanction. Immediately after this was done, the Seminole operators were unanimous in agreeing to the plan, and their attitude is best demonstrated by the fact that the daily output of the field

TABLE I—DAILY OUTPUT OF PETROLEUM IN THE UNITED STATES SHOWING DECLINE DURING PERIOD OF SEMINOLE RESTRICTION (American Petroleum Institute Figures.)

Daily Average for Week Ending		Change (Increase or Decrease)
1927		
June 4.....	2,507,300	19,000 inc.
June 11.....	2,498,450	8,850 dec.
June 18.....	2,509,650	11,200 inc.
June 25.....	2,510,750	1,100 inc.
July 2.....	2,535,550	24,800 inc.
July 9.....	2,534,950	600 dec.
July 16.....	2,544,250	9,300 inc.
July 23.....	2,573,850	29,600 inc.
July 30.....	2,586,100	12,250 inc.
Aug. 6.....	2,577,150	8,950 * dec.
Aug. 13.....	2,575,550	1,600 * dec.
Aug. 20.....	2,518,400	57,150 * dec.
Aug. 27.....	2,506,900	11,500 * dec.
Sept. 3.....	2,512,250	5,250 * inc.
Sept. 10.....	2,505,400	6,850 * dec.
Sept. 17.....	2,494,850	10,555 * dec.

\* Period of Seminole restriction. Total decline from July 30 to Sept. 15, 91,250 barrels daily average.

was reduced to 451,000 barrels on August 20, just 15 days after the Oklahoma Corporation Commission ratified the program.

Pinching in Seminole production by 50,000 barrels daily did not, of course, have any immediate effects on relieving the overproduction situation. The really important feature of the agreement is the fact that it marks probably the first time in the petroleum industry when so many operators with different interests could get together and agree to one definite plan of action. When it is considered the interests of many of the companies are entirely different; that some companies had a large production and others were not so fortunate; that certain companies had acreage which became practically proven territory by developments; that others had drilled up to most of their holdings; that some companies needed for production from their leases for their refinery requirements and others because of contracts—when these things are considered, the fact that all of these operators did agree to the one plan marks a step forward in matters so vital to the prosperity of the industry.

#### PLANS FOR PERMANENT STABILIZATION

The curtailment of production in the Seminole area was merely in the nature of a test case and an expedient for temporary relief. The problem of dealing with future periods of possible overproduction still remains, and this problem has occupied the minds of oil executives, oil attorneys, and Federal Government officials. The Federal Oil Conservation Board, appointed by the President of the United States, while concerned primarily with the prevention of waste and the conservation of oil supplies, devoted considerable study to the question of production control.

The difficulties confronting all proposals for a permanent and workable plan of production stabilization are personal and economic, political, administrative and legal. The personal problem is related to the difficulties of inducing all leaseholders or landowners toward coöperation in a voluntary curtailment program during periods of flush production, or to withhold development when test wells show the presence of a large oil pool in a group of properties. This situation is somewhat aggravated by the wildcatters whose activities cannot be restrained by any legal or coöperative means. It must not be inferred that the wildcatter is necessarily a bane to the industry; rather, his speculative activities have frequently in the past been responsible in maintaining an adequate supply of oil.

Political or administrative difficulties come about by reason of the fact that oil is produced in several states and control of production is outside the jurisdiction of the Federal Government. This duty, if it is to be exercised, devolves upon the oil producing states. "This would require (regulatory) commissions with such powers in Oklahoma, Texas, California, Louisiana, and Arkansas. None of these could be omitted from the scheme with any safety, for in each of them there has been, in the past few years, some one or more fields whose production made an excess in supply over demand in the entire country; surely it should be anticipated that these instances will occur again. "Even" a coöperative agreement of the commissions of these oil producing states "would not give certain protection against a recurrence of overproduction, if large deposits should be found elsewhere—for example, in Missouri, where I understand the geological conditions are favorable. But I do not believe the

requisite legislation could be procured in the five states mentioned. Endeavors to procure this would have to be made by the oil companies; no one else could be made sufficiently interested.

"No matter how camouflaged, as designed to conserve gas, it would be plain that the proposed measures were to restrict production of oil. Any legislator would know that this would increase the price of gasoline. The average legislator would think that the measures were intended to help the big oil companies at the expense of his constituents. Further, it is my experience that legislatures are not much interested in proposals for the benefit of all of the people of our Nation; they are concerned chiefly in the welfare of the citizens of their own state. Assuming that you could convince the Legislature of California, for example, that restriction of production is essential for all the people, including Californians, would it not delay to act until Texas and Oklahoma should adopt measures to that end? Would not such legislative delays result from fear that its own people might be put at a disadvantage by failure of the other states to conserve oil? I think my pessimism is not unwarranted when we recall the failures, for over twenty years, to procure uniform laws of divorce and of negotiable paper. There was no dispute of the necessity for these measures, nor suspicion of the purposes of their proponents."<sup>1</sup>

#### FURTHER STUDIES AND PROPOSALS

The difficulties reviewed above would make it appear that stabilization of production is a well-nigh impossible task. The leaders of the industry have not, however, ceased to study

the problem. Various proposals were put forward from time to time in an effort to arrive at a practicable and workable plan. Most of these suggestions urged the adoption of unit development, that is, the most economical and least wasteful development of an entire pool by coöperative agreement of all land owners and leaseholders. That such a plan, in order to be fair and equitable to all interested parties, presents many difficulties is admitted; but it has worked in the Seminole area and this gives hope that it can be applied in a practicable way in other pools if necessary. With the unit development method in view, a plan has been submitted to the Oil Conservation Board, together with suggested legislation, by a committee of nine operators, government officials and attorneys. The plan suggested by the Committee of Nine is essentially that of giving legal sanction (Federal and State) to the unit plan of development. The recommendations embodied in a tentative bill suggested for action by Congress may be summarized as follows:

1. Federal legislation which shall (a) unequivocally declare that agreements for the coöperative development and operation of single pools are not in violation of the federal anti-trust laws, and (b) permit, under suitable safeguards, the making, in times of overproduction, of agreements between oil producers for the curtailment of production.

2. Similar legislation by the various oil-producing states.

3. Immediate further study into the matter of the waste of natural gas, in order that legislation may be formulated which will forbid such waste as fully as may be done without injury and unreasonable hardship.

4. Legislation by Congress granting the Secretary of the Interior authority

<sup>1</sup> Proctor, Judge, F. C., "The Oil Problem," *The Lamp*, Vol. 10, No. 3, October, 1927, p. 17.



to join and to permit lessees from the Government to join in agreements for the coöperative development and operation of single pools.

5. The passage by Congress of the legislation removing the existing mandate upon the Secretary of the Interior to offer for lease annually, regardless of conditions, one hundred thousand acres of Osage Indian lands.<sup>1</sup>

The Seminole plan of curtailing production was followed by similar action in several other pools, notably in California, for the Hendricks Pool in Winkler County, Texas, and for the Yates Pool in Pecos County, Texas. The plan of control in the Yates Pool does not permit tracts of less than 100 acres to be used as units and limits the depth of drilling to 225 feet in the limestone thus avoiding deep testing. The net result of these voluntary curtailments together with the natural decline of some of the large pools has been a reduction in daily average output from 2,476,000 barrels in 1927 to 2,376,000 barrels at the end of May, 1928. Stocks of crude are being drawn upon and the price structure is more encouraging to the producers.

The curtailment activities of the

<sup>1</sup> *Oil and Gas Journal*, February 9, 1928, p. 249.

past eighteen months are, however, but temporary expedients. A permanent solution is imperatively needed for the crude oil industry. No progress can be made in overcoming the ever present spectre of overproduction until the industry in four or five of the leading oil-producing states can agree upon a plan to avert, as well as stop, overproduction as a permanent principle in the conduct of the oil industry. Along with the control of domestic output the question of imports from South America needs consideration. These imports have been averaging a little more than 200,000 barrels daily and are given as the reason for the increase in crude oil stocks in this country. In the Mid-Continent area, at least, crude oil is being withdrawn from storage, an estimate of 90,000 barrels daily being made from withdrawals in Oklahoma, Kansas, and North Texas. Were it not from the large shipments of South American crude oil being received here, it is argued, the industry would be in far better condition. Operators are becoming more reluctant to restrict their operations in this country when they say no seeming effort is being made to help the situation by reducing imports of crude.



# Present Plans for Stabilizing the Oil Industry

By ABRAM F. MYERS

Federal Trade Commissioner; Member, Committee of Nine of the Federal Oil Conservation Board<sup>1</sup>

TO one who, like the writer, believes that the future prosperity of American industry and the avoidance of monopoly depend upon effective measures of stabilization to be achieved through the efficient coöperation of separately owned (*i.e.*, independent) industrial units, the oil industry affords a case in point.

## HISTORY

In no other industry (save, possibly, bituminous) is the need for stabilization (which involves, also, conservation) so pressing, and in no other (save, possibly, agriculture) are the obstacles so great. The necessities of the case grow out of the vagrant characteristics of the basic product, the supply of which depends on constant prospecting and can be measured only by actual recoveries. The history of the industry has been one of chronic overproduction and waste, and times without number the heartening prospect of approaching balance between production and consumption has been obliterated by a flood of oil descending from some newly discovered field.

The difficulties of the case inhere in the legal concept of property in oil, which, in turn, results from the peculiar characteristics of the commodity.<sup>2</sup>

<sup>1</sup> Authority for the statistics cited in this article will be found in the Federal Trade Commission Report on Prices, Profits and Competition in the Petroleum Industry, issued December 12, 1927.

<sup>2</sup> Readers interested in the legal principles governing the extraction of oil and gas, and the proper conservation of those commodities, should consult the able paper of Mr. James A.

True property in oil, as in animals *ferae naturae*, begins only with capture. Thus, while it would be an actionable wrong for one operator to take oil from the land of an adjoining owner *over* the fence, it is perfectly lawful for him to drain the oil from the contiguous property *under* the fence. The fact that the owner of oil land has only a theoretical property right in the oil beneath the surface, and can realize on that right only to the extent that he recovers the oil through wells on his land before adjoining landowners can capture it through wells on their land, introduces a competitive element in the production of petroleum which exists in no other industry.

Instability also has been promoted by the gradual decentralization of control in the industry. At an early stage the petroleum industry came almost wholly under the control of a combination, the so-called Standard Oil Trust, and although that combination in its ultimate holding company form was dissolved by judicial decree in 1911, the character of the decree was such that a community of interest persisted for a considerable period. In recent years this solidarity has been largely dissipated by the diffusion of ownership of Standard securities and the growing independence of the company managers. And while the Standard companies have prospered and enlarged their business as a result of the greatly increased demand for petroleum prod-

Veasey in Volume 52 of the Reports of the American Bar Association, at page 577.

ucts, they have failed to maintain their dominance in their respective territories, due to the increasing percentage of new business taken by the so-called independent companies.

#### SUPPLY AND DEMAND

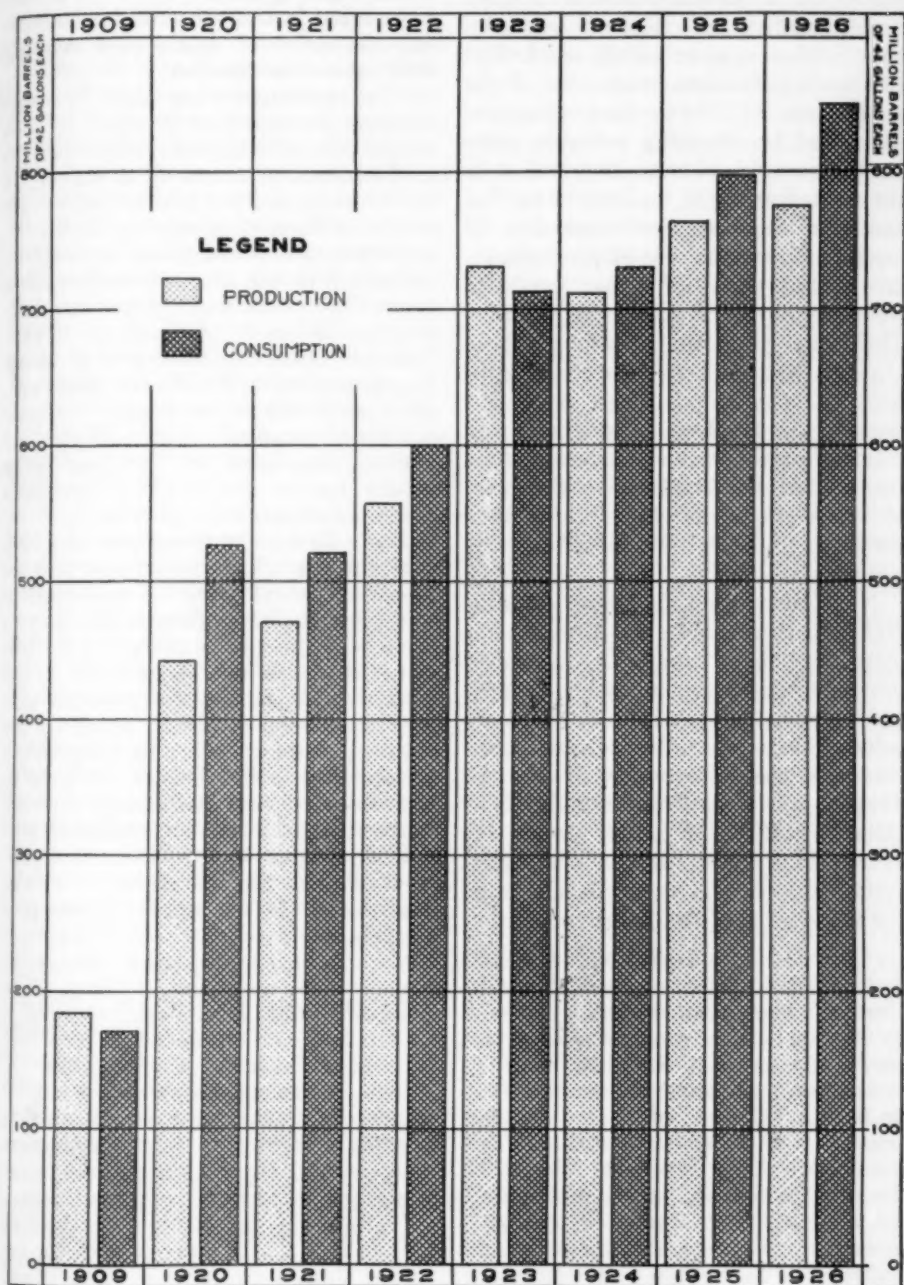
Lest it be considered that the lack of coördination between supply and demand in the crude petroleum market indicates an inexhaustible supply of domestic crude and a lack of need for conservation measures, the importance of crude imports should be considered. Domestic production and consumption were nearly balanced in 1909, production being only 6.5 per cent greater than consumption. From 1909 to 1926 production increased to 770,874,000 barrels, or 320.8 per cent, and consumption increased to 845,296,000 barrels, or 391.9 per cent. The growth and the relations between domestic production and consumption are shown graphically in Chart I, on the opposite page. The chart shows that consumption has exceeded production each year of the seven-year period 1920-1926, excepting in 1923. Consumption increased steadily throughout the period, but in 1924 production was about 18,500,000 barrels smaller than for 1923. The gain for consumption in 1926 over 1925 was 5.9 per cent, as compared with an increase in production of only about one per cent.

Notwithstanding the steady increase of consumption over domestic production, the quantity of crude petroleum held in storage above ground has increased, with but minor interruptions, since 1921. Thus the deficit in domestic production is made up and a surplus created by imports of crude petroleum. The total stocks of crude and partly refined products have increased from 279,162,183 barrels in 1921 to a high water mark of 554,566,976 barrels in 1925. In 1926 there was some reduc-

tion, and at the close of the year the figure stood at 528,500,000 barrels. Millions of gallons of crude oil have remained in storage untouched since 1921. In addition, during much of this period there have been large quantities of gasoline, kerosene, gas and fuel oil held in storage. In an industry the life of which is dependent on new discoveries, it is, of course, imperative that certain reserves be carried, although it is difficult to say what the margin should be. The rapid increase in the annual consumption of crude, particularly during the past ten years, has led many refiners to hold considerable quantities of crude in storage, and this has been greatly overdone. But the main reason for the overproduction, giving rise to burdensome storage conditions, is the desire of each producer to secure possession of as much crude as possible before it can be drained from his land by surrounding operators.

#### PRICE CONDITION

The peculiar characteristics of the industry mentioned at the outset have given rise to a price condition quite outside of the control of even the most powerful crude oil purchasing companies. The rate of production of crude petroleum often is checked by reduction in the price at the oil wells, but whenever a prolific new pool is discovered in which there are numerous producing interests, even successive price reductions fail to check production. In such cases the desire of each operator to recover as much of the oil as he can in as little time as possible overcomes the incentive to ease up on production to await a higher price. Again, efforts by the leaders of the industry to advance the price, or to maintain it at a favorable level, frequently are defeated by the resultant stimulation of production. The large crude

**PRODUCTION AND CONSUMPTION OF CRUDE PETROLEUM  
IN THE UNITED STATES, 1909 AND 1920-1926.**

petroleum purchasing companies, which establish the market price for crude oil, are in an awkward position. Either directly or through affiliated companies they produce approximately one-half of the crude petroleum production of the entire country. As producers they are interested in obtaining a higher price for their crude, whether they sell it in the crude form or in the form of refined products, because the marketers of gasoline and other refined products increase the price of those products whenever crude is increased in price. The crude petroleum stocks of these same companies, both parent and subsidiary, constituted about 76.4 per cent of the total crude stocks of the country at the end of 1923, and 65.4 per cent June 30, 1926. As owners of these enormous stocks they have naturally hoped to refine or sell them at remunerative prices.

Notwithstanding the tremendous increase in their stocks the crude petroleum purchasing companies advanced prices at or near the beginning of 1922, 1923, 1924, 1925 and 1926. The results of these efforts are reflected in a statement issued by Mr. Walter C. Teagle, president of the Standard Oil Company (N. J.), dated March 12, 1927. This statement also is an interesting summary of the situation from the standpoint of the industry:

"The year 1926 ended with approximately 530,000,000 barrels of stocks in storage, which was a reduction of about 25,000,000 barrels from the 555,000,000 barrels on hand at the close of 1925. It is almost the same amount as that on hand at the end of 1924. At that time, at the American Petroleum Institute meeting at Fort Worth, I stressed the fact that the industry had not allowed its storage reserve to perform its true function in the economic scheme. What would you think of a Federal reserve system which locked up its gold reserves and increased the dis-

count rate at the slightest sign of an expansion in credit? These petroleum stocks, like our bank reserves, should be utilized in time of need for stabilizing the price of crude and meeting fluctuations in demand.

"I do not know what might be a safe reserve of crude and products. That would vary with the current production and consumption and oil in sight. It is, however, patent that for some years we have been carrying too much oil, and that we could stand a material reduction before stocks would reach a point that would necessitate the bringing in of new production. Every barrel of crude oil above ground today means more than it did a few years ago, because crude is no longer our sole source of gasoline. The industry acquired the habit of carrying large stocks before the cracking processes became such an important factor in refining. In view of the extent to which fuel and gas oil are now being run for gasoline, every barrel of crude oil in storage is the equivalent of almost two barrels in the anticracking days. Under such conditions an advance in the posted price, or the maintenance of a price no longer justified, is not in the interest of the industry or even of the producer himself. We do not have to look back very far to discover that advances in price have stimulated new drilling, which in turn increased production with the net result that the price had to be cut when the new production was marketed. Had this been foreseen, there would have been no incentive for increased drilling. The producer would have been better off if prices had not advanced at the first sign of a draft on the reserves. If drafts on the big stocks above ground had been allowed to continue until it became certain that more production was needed, the higher posted prices would probably have been maintained.

"The problem is made more difficult by the fact that a large part of the reserves went into storage when prices were higher than those now prevailing. With the tankage and the annual carry-



ing charges, the real cost of this oil, regardless of how it may be carried in the books of the different companies, is now materially above the prices prevailing before the recent reductions. Further, this built-up cost is so much higher than the average cost of producing oil that before the price reaches a point which would enable the owners of these reserves to get out whole, drilling would be stimulated to an extent which judging from past experience, would bring about a recurrence of overproduction. At the end of 1921 stocks of crude and products amounted to about 203,000,000 barrels. Since that time the industry has accumulated an additional 327,000,000 barrels. A rough calculation indicates that at the end of 1926 the built-up cost for these additional reserves was approximately \$2.90 a barrel.

"Our surplus stocks should be allowed to function as a real reserve. Had this been so and prices had not been advanced it is doubtful whether we would have had the spirited drilling campaign of last summer. The oil would have remained in the ground where it would not have been a burden on the industry. Now we are all engaged in bringing it to the surface, selling a part at prices lower than expected, and putting the balance into storage, subject to heavy carrying charges. This is the penalty which the industry is paying for its failure to properly appraise the importance of the stocks above ground.

#### REMEDIAL MEASURES

These conditions are engaging attention of the industry and the government. The obvious remedy is curtailment of domestic production. Self-preservation dictates that the country shall satisfy its needs, so far as possible, from foreign oil and conserve its own supply of this invaluable resource. The attitude of the Federal Oil Conservation Board, under the leadership of Secretary Work, has been consistent, constructive and progressive. In

the industry there is no unanimity of thought or action, and in some quarters there has been active opposition to the efforts of the Federal Board. Efforts in the industry to work out the problem from the standpoint of conservation have met with no encouraging response. The Board, nevertheless, has been tireless in its advocacy of conservation. In its report to the President of the United States in September, 1926, the Board stated, in part:

"Another avenue of relief is the restriction of development or operation through voluntary agreement of owners. This suggestion is not novel for it has to a limited extent been tested in actual practice and can be discussed in the light of experience. Agreement between neighboring property owners as to the handling of their common property and the protection of their mutual rights is more and more generally recognized as making for economy in development and efficiency in extraction as compared with competitive drilling. Indeed, operators of experience have expressed to the board the opinion that duplication in drilling and the consequent unnecessary reduction of gas pressure constitute the cause of all waste worth mentioning in the production of oil. The danger that much of the remaining oil will be brought to the surface, before either courts or law-makers can be expected to remedy the situation, has also prompted the expression of opinion to the board that voluntary coöperation offers the only practical hope.

"The question of the legality of coöperative agreements has been frequently raised in the recent discussion of remedial measures. The uncertainty as to whether the economic betterment through substituting coöperation for competition runs counter to Federal and State laws has served as an actual or imagined or pretended barrier to coöperative action and the removal of that legal inhibition is



asked, although the suggestion comes from the industry that "to protect the public, approval of such agreements by some commission or board should be required." This doubt should be removed by appropriate legislation.

"The voluntary coöperation proposed would need to include the land-owners and operators in a single field or pool, which is a relatively small unit of production, so that the possibility of monopolistic control need not be feared. Indeed, coöperative regulation of either the development or the operation of a single pool could control only a small percentage of the country's production. . . .

"The question of the country-wide influence of such coöperative action on either supply or price would, moreover, under any legalized procedure, be always subject to "appropriate and adequate governmental scrutiny," quoting from counsel of the American Petroleum Institute, "to the end that these owners might not be stimulated to undue haste and a wasteful competition in the development of their properties and trade, but might have a greater liberty to consult the economic conditions of the industry from time to time."

Information secured by the Federal Trade Commission during its latest inquiry indicates that agreements to restrict production have been made in the Salt Creek field in Wyoming, in the Panhandle district in Texas, and the Seminole field in Oklahoma. The report of the president of the Salt Creek Consolidated Oil Company to the stockholders dated May 1, 1923, stated, with regard to curtailment of production:

"The past year has witnessed a rather wide fluctuation in the price of oil in the Salt Creek field, the first six months of 1922 averaging \$1.40 per barrel. In August the price broke and went as low as 70 cents, recovering to about \$1.05 in December. The production

from the Salt Creek field was curtailed by mutual agreement among the operators for most of the year, oil being produced under a proration of from 25 to 35 per cent of the tested well capacity. While the price for oil was low our production was kept at a minimum as it was deemed better policy to keep the oil in the ground rather than market it.

"A considerable development program was carried on throughout the year, under which the lease lines were protected from all offsets. The development of the company's properties will compare favorably with any property in the Salt Creek field, having a potential production of over 20,000 barrels a day from the present wells, from which, under the existing proration, our share of the production has been averaging something better than 6,000 barrels per day. During the first quarter of 1923 the price of oil was greatly increased, so that the average price per barrel has been \$1.45. The gross income from oil sold in March, 1923, was approximately \$325,000, with oil at \$1.65 per barrel.

"The operators in the Salt Creek field have decided to continue for the year, 1923, the proration of production and have limited the number of wells which shall be drilled, so that there will be no overproduction and no unreasonable expenditures for wells. This is an innovation and something never heretofore worked out in the oil business, but events so far have shown the wisdom of this policy which has resulted in great mutual benefit in obtaining a fair price for the oil and the conservation of the field."

#### EFFECT OF CONTROL OF PRODUCTION

The extent and effect of control of production in the Salt Creek field in 1922 and 1923 are described as follows in the 1926 report of the Federal Conservation Board:

"In the one instance of coöperative control by the Salt Creek Conservation Committee, the prorating of production

in 1922 and 1923 reduced the output to perhaps one-third of the productive capacity of the 600 to 700 wells then producing. The effect of the committee's restrictions on production was a matter of only 8 or 9 per cent of the country's production of that period."

On September 28, 1926, a meeting of the Mid-Continent Oil and Gas Association was held in Tulsa, at which 90 per cent of the current production in the Panhandle field was represented. In the course of the meeting it was proposed to shut down on drilling operations until the spring of 1927 on account of alleged overproduction and lack of market for oil. This was described as a purely voluntary co-operative effort, the Mid-Continent Association disclaiming any responsibility for it. The project was favored by the large producers and opposed by some of the smaller individual producers. Conditions were such that there was some curtailment perforce, but information is now lacking as to the extent to which production was lowered as a result of any understanding or agreement arrived at by the producers.

There have been four agreements regarding decreasing the production in the Seminole fields. On November 1, 1926, the Seminole pool was producing more oil than the pipe lines could handle. The producers did not have sufficient steel storage to take care of the surplus oil, and some was going on the ground and down the creeks. The Seminole operators and pipe line companies met on November 3 and agreed to prorate production and runs and to restrict the drilling of new wells. Mr. Ray M. Collins of the Echo Oil Company was designated umpire and given power to carry out the plan. The actual prorating of production began on November 9, when the production of the field was cut to 80 per cent, which was the capacity of the pipe lines. A

prorate of from 75 to 95 per cent of the potential production was maintained until November 21. On that date the pipe line companies, by means of new lines and steel tanks, were able to take care of all the oil produced. All restrictions on drilling were removed by action of the operators on November 29.

On February 17, 1927, the Seminole operators again met, and asked Mr. Collins to investigate conditions as of that date and report to them his findings and recommendations. Mr. Collins reported that the Seminole production was exceeding pipe line runs from the field, and suggested that the shooting of all wells be stopped until the pipe line and storage capacity of the field should equal the production. He further recommended discontinuance of all drilling operations in the field excepting offset wells drilled on short-term leases, and that all new wells about to start on new locations should discontinue work except where such shutdown would benefit the adjoining lease. His report also suggested that should the producers be unable to agree on a program to restrict drilling and shooting, the production and runs should be prorated as long as the overproduction existed. On February 24 operators adopted the resolution set out in the margin.<sup>3</sup> This plan was car-

<sup>3</sup> Resolution as of February 24: "Your committee, appointed to devise a plan for the equalization of the production and outlet of the general Seminole area, report the following recommendations:

"First. That during the period of overproduction, not exceeding 30 days from this date, no operator in the 9-5 or 8-6 area shall be permitted to complete and put to production more than one well on each 40-acre tract held by him in these two areas, and when the particular operator has completed and is producing one well from such 40-acre tract he shall cease drilling all other wells on the particular 40-acre tract at the casing point on the top of the Viola line, it being our further recommendation that where

ried out with the full coöperation of the Oklahoma Corporation Commission, which is charged by law with the duty of prorating shipments in times of overproduction, and of seeing that no oil or gas is permitted to be wasted. This program was to continue for a period of 30 days, or not later than March 26. Mr. Collins estimated the oil shut in on March 21, 1927, at 25,000 barrels daily.

Early in May, 1927, Walter C. Teagle of the Standard Oil Company

there are 20-acre tracts the same may be considered as a 40-acre tract under the provisions of this paragraph, subject to the approval of the umpire and advisory committee hereinafter provided for. The recommendations here made contemplate that each operator shall elect the well he may drill hereunder and the further right to, during the period that the plan is in force, protect the title or titles to his property by such further operations as may be necessary for that purpose.

"Second. That during such period of overproduction each producer shall be required to handle at least one-third of his production through a storage built by him.

"Third. If during the period of overproduction in the general Seminole area, including the original fields and in the 8-6 and 9-5 areas, oil shall be permitted to escape upon the ground, whether in earthen storage or otherwise, the umpire hereinafter provided for shall have the authority to order not more than a 10 per cent reduction in the production of each producer producing oil in the original Seminole field as well as in the 8-6 and 9-5 area, provided no complaint in regard to the escape of oil on the ground may be made on the part of any operator who at the time is not providing storage for one-third of his production.

"Fourth. This agreement shall not continue beyond the period of overproduction in the areas covered by this recommendation, and we hereby recommend that Ray M. Collins be appointed as umpire to enforce the recommendations hereby made.

"Fifth. We further recommend that A. A. Beard, Tidal Oil Co., H. N. Cole, the Pure Oil Co., and George Moody, Mid-Continent Petroleum Corporation, be appointed as an advisory committee to consult with and direct the actions of the umpire to carry out the program hereinabove provided for."

(N. J.) and James A. Veasey, general counsel of the Carter Oil Company, discussed the need for curtailment of oil production with Secretary Work, the chairman of the Federal Oil Conservation Board. As a result of this conference Mr. Teagle called a meeting of leading oil men at New York on May 11, 1927. At the later meeting it was decided to restrict the drilling of wells in the greater Seminole area until May 25 and that Mr. Ray M. Collins should again be named umpire. A committee was appointed to work out a more comprehensive plan. On May 14, representatives of more than twenty companies operating in the Seminole area met at Tulsa, Oklahoma, and adopted a resolution accepting in principle the shutdown plan adopted by the meeting in New York and pledging coöperation in bringing about a shutdown. Meantime the committee named at the New York meeting met with the Federal Oil Conservation Board, but the conference was concluded by Secretary Work because the committee seemingly had no plan to propose.

At a meeting of the operators in New York on May 25, 1927, Mr. Collins reported that there was a feeling among the Seminole operators that the condition of overproduction was due as much to the west Texas and California fields as to the Seminole. He nevertheless recommended cessation of drilling and restriction of production on certain properties in the Seminole field where this could be done without drainage or loss of pressure. The meeting approved Mr. Collins' report for restricting the drilling and completion of certain wells and again designated him as umpire. The operators further resolved:

"That all questions of appeal to the corporation commission for the exercise of any authority vested by law in said commission be left to the determination

of the operators in the Seminole pool or their local representatives in a meeting called for such purpose.

"That these resolutions continue in force until such time as 10 or more of the operators subscribing to this resolution shall have served notice upon the umpire in writing of their withdrawal herefrom.

"That we are committed to the policy adopted by the Seminole producers, in so far as our operations extend throughout the State of Oklahoma, and will do all that we reasonably and lawfully can in the interest of conservation of oil as a national resource, to the end that waste, as defined by the statutes of Oklahoma, may be avoided."

The production of crude petroleum in the Seminole field increased from a daily average of 351,430 barrels for the week ending May 21, 1927, to 514,085 barrels daily for the week ending July 30, 1927. Meetings of operators in the Seminole area were held early in August, 1927, and an agreement was made to restrict production to 450,000 barrels per day, to be prorated according to the potential production of each lease, the plan to be effective after approval by the Corporation Commission of Oklahoma. This agreement was filed with the Commission on August 9, and on the same day it was approved, and an order was entered appointing Mr. Collins agent of the Commission to carry out the terms of the agreement. Testimony had previously been taken under an application filed by Mr. Collins on July 1, so that the Commission was fully advised of the situation. In regard to waste of oil, the findings of the Corporation Commission were as follows:

"First. That the testimony in said cause shows a waste of oil in said Seminole field as defined by the statutes of the State of Oklahoma.

"Second. That if the terms and provisions of the curtailment plan and

contract entered into between the operators and producers of oil in said field are carried into effect the same will prevent a further waste of oil in said field."

The production of crude oil in the Seminole field decreased from the daily average of 514,085 barrels at the end of July to 436,115 barrels daily for the week ending August 27, 1927.

#### CONSERVATION'S NEED OF LEGAL ADVICE

In September, 1927, Secretary Work delivered an address before the American Bar Association at its annual convention in Buffalo on "Conservation's Need of Legal Advice."<sup>4</sup> He outlined the need for rationalization of the production of petroleum and the practical and legal obstacles to be overcome, and asked the Association to contribute to national conservation the legal advice it so sorely needed. The president of the Association responded by designating three lawyers of outstanding ability from the mineral law section of the Association. The Federal Board provided for a committee of nine to consist of the three members designated by the Bar Association, three representatives to be designated by the oil industry, and three representatives of the government.

The Secretaries of the Interior, War, Navy and Commerce, comprising the Federal Board, depicted in unforgettable terms the dependence of transportation, industry and the national defense on an adequate supply of petroleum products, and charged the Committee of Nine with great earnestness to give its best endeavors to finding a solution of the problem.

The committee reviewed the previous efforts to work out a conservation program and issued a broad in-

<sup>4</sup> Reports of the American Bar Association, Vol. 52, p. 566.



vitiation for suggestions which might prove constructive or helpful. After an enormous amount of material had been digested, and public hearings had been had, it was found that the committee were in substantial agreement on fundamental jurisdictional questions which seemed to delimit the sphere of activity, at least so far as the Federal Government was concerned. The problem was to devise a legislative program which would include both permissive and compulsory legislation and would, at the same time, harmonize with the division of power between the State and Federal Governments.

The committee postulated that true conservation does not mean the withholding from present use of the Nation's natural resources. Rather it means that those resources "should be drawn upon without waste and in orderly response to the economic needs of the country." So far as concerns waste of oil, it was found that there is no substantial waste after the oil is once produced.<sup>5</sup> When it is once out of the ground it is practically all put to beneficial uses, the character of the uses and the amount dedicated to each being determined by economic factors. The committee found, on the other hand, that there is a distinct waste in the process of getting the oil out of the ground. It consists in the failure to recover from the sands in which the oil occurs the full proportion of the oil content that is susceptible of recovery by the most efficient and yet practical methods of production. The proportion of the oil recovered in actual competitive practice is in the judgment of competent engineers as low as 20 per cent in many cases. The balance of

the oil is not lost in the sense that it is destroyed or dissipated; but so far as its recovery for economic uses is concerned, it is lost, since there is no known method by which it can be recovered at a reasonable cost. There is a sharp difference of opinion as to the extent to which the recoverable proportion of the oil content might be increased in practical operation. The weight of opinion is that the amount is appreciable, some opinions being that the increase might well equal the amount of present recovery.

According to the committee the primary cause of the failure to recover the full recoverable proportion of the oil content, and of overproduction at recurring periods, is to be found in the law governing the right of the owner of land to recover oil from it.

The result is that when an oil field is once opened, it is a race between all the owners in the field to recover all each can. It is a race in which they must take part, willy-nilly, or else lose what otherwise they might obtain. It is a race which can be avoided only by the joint action of every one in the field.

The sentence last-quoted is the key to the committee's report. The fundamental law governing the right of recovery can not be changed. Practical difficulties preclude such a solution, even if constitutional objections are put out of view.

#### COÖPERATIVE DEVELOPMENT

Proceeding under the present law, the thing that immediately suggested itself was the coöperative development of any single field by its owners and operators. By single field is meant a single pool or deposit wherein the operations of one owner affect his neighbors. By such coöperative development, the gas content can be conserved and utilized to the fullest possible extent and for the benefit of the whole field.

<sup>5</sup> This statement does not take into account such factors as loss of more volatile elements in storage following overproduction and economic waste in storage and overexpansion in retail distribution.



This, it is believed, should increase greatly the total actual recovery from the field.

Theoretically this method of operation can be brought about either by voluntary agreement of all the owners in a given field, or by the coercive power of the state. The committee were agreed that the exertion of such coercive power, assuming its existence, rested with the states, not with the Federal Government. A suggested method was the formation of state instrumentalities such as oil districts, analogous to irrigation districts, on which would be conferred the power to impose a common plan of development and operation on a whole field. The practical difficulties which stood in the way of definite recommendations by a board composed mainly of lawyers were that no two fields are alike, and a plan for common development and operation which would be best and most equitable for one field, probably would not be applicable to another field where different conditions obtained.

While the committee was not prepared to recommend a program of coercive legislation, either state or national, it felt that all obstacles to voluntary coöperative agreements should be removed, so far as consistent with the public interest. A formidable obstacle to such voluntary agreements is the fear that such agreements may be held to be in violation of the antitrust laws, both state and Federal. An almost necessary feature of any coöperative plan is control of production, and because of this the fear has arisen. Eminent lawyers, one of whom was heard by the committee, hold the view that there is nothing in the antitrust laws, more especially the Federal laws, that prevents such agreements. The committee doubted whether any agreement for the coöperative development

and operation of a single pool, even though it involved the control or curtailment of production, would be a contract or agreement in violation of the statutes against restraints of trade. Nevertheless, the fear exists and operates as an artificial stimulus to production beyond the requirements of the market, and the committee was unanimously of the opinion that it should be removed. Appended to the committee report was a form of an act by Congress which would provide that

No agreement by two or more persons for the coöperative development and operation of an oil and gas pool shall be deemed in violation of any of the acts of Congress forbidding monopolies or agreements in restraint of trade.<sup>4</sup>

#### OBJECTIONS TO COÖPERATIVE AGREEMENTS

It was recognized that while such legislation would be helpful, it would not be adequate in times of extreme overproduction, resulting from the bringing in of new fields. The periodic recurrence of such conditions is inherent in the circumstances in which the oil is found and under which it must be produced. Drastic legal restrictions on production would be wholly impractical and of doubtful constitutionality. Any attempt to regulate the industry in that way would constitute a departure from established principles of government and involve experimentation along lines abhorrent to the overwhelming preponderance of public opinion. Nothing short of complete nationalization of the industry, including rigid regulation of production and prices, would suffice. No support for such a program could be found in

<sup>4</sup> The report continued: "The legislation to be passed by the states should be in the same form, with such possible variations in exact wording as may be appropriate because of the differences in the antitrust laws of the different states."

the committee. It was thought, however, that the injurious effects of overproduction could be much diminished by permitting at such times the curtailment of drilling and production by voluntary agreements between the oil producers. At the present time such agreements, no matter what the necessity or justification for them, would be in violation of the antitrust laws of some, if not all, of the oil-producing states, and under some circumstances in violation of the Federal antitrust laws.

It was not to be expected that the public would approve of the granting of substantial immunity under the antitrust laws without proper safeguards against extortion. To impose price regulation as a condition to the granting of immunity for voluntary agreements probably would act as a deterrent and defeat the very policy which the government seeks to encourage. The committee, therefore, was of opinion that the immunity should be confined to times when serious overproduction exists or is immediately threatened, and should end when the emergency ends. All this, the committee felt, could be accomplished by legislation providing (a) that during a period of overproduction or in immediate anticipation of one, agreements curtailing the development and production of oil shall not be in violation of the laws, state or Federal, forbidding restraints on competition; (b) that a period of overproduction permitting of such agreements be deemed to exist only when so declared by suitable governmental authority, and be deemed to end when that fact is similarly declared; (c) that all such agreements be subject to supervision by suitable governmental authority, be filed with it as a condition of their legality, and do not become effective until they are so filed; and (d) that the supervising authority have the right to

abrogate any agreement filed which for any reason it judges not to be in the public interest.

As the granting of permission for such agreements would be primarily a conservation measure, and as also it would be a matter of distinct importance, it was thought not unfitting that the governmental authority which might declare when such agreements could be made and the period for which they should be effective and have supervision over them, should be the Federal Oil Conservation Board itself. Consequently, the form of act of Congress appended to the report confers such powers and duties on that Board.

#### CONSERVATION OF GAS

One matter on which the report of the committee is disappointing has to do with properly conserving the gas content of oil pools. The waste of gas in actual practice has been great, both in the failure to maintain the gas pressure for oil-producing purposes, and in the failure to put the gas to the valuable economic uses of which it is capable. Enormous quantities of gas have been wasted into the open air or burned. The committee were agreed, in general, that the waste of gas should be forbidden by law. They also were agreed that "suitable legislation to this end is the most important affirmative step to compel conservation that can be taken." Further, that "such legislation, if properly devised, will . . . not only prevent waste existing at the present time, but will have a decided effect in inducing agreements for the coöperative development and operation of oil fields."

But the committee felt unable "for the present" to determine just the form that such legislation should take. The committee were clear that the mere fact that a given measure would affect some interests adversely would

not be a sufficient reason for rejecting it. But conditions in the various fields differ so greatly that a uniform and inflexible practice might prove unworkable in some districts. Such legislation, moreover, is legislation which must be adopted by the states. The committee, therefore, recommended "that further study be given in the immediate future to the form such legislation should take, and that when that study has been completed, definite recommendations be made to the oil-producing states." Whether the Committee of Nine will be charged with the duty of making such further study rests with the Federal Oil Conservation Board.<sup>7</sup>

#### AS TO THE FUTURE

It would seem safe to predict that sentiment is crystallizing in the indus-

<sup>7</sup> While this paper was being written word was received that the American Bar Association at its annual convention at Seattle, Wash., had endorsed the recommendations of the Committee.

try and in governmental and legal circles in favor of the program recommended by the Committee of Nine. That program appears to constitute a fair compromise between the extremes of trustification and nationalization which have been advocated in recent years. Two members of the committee representing the oil industry had participated in previous conferences on conservation, and the fact that they signed the committee report has been interpreted as indicating a more liberal view in the industry. The matter is one of paramount importance and its correct solution will be of immense public benefit, both from the standpoint of conservation and stabilization. The measures proposed probably go as far towards these goals as public policy will permit. From any point of view, it is not merely desirable, but vitally necessary, that the Nation's supply of oil "should be drawn upon without waste and in orderly response to the economic needs of the country."

# The Problem of Seasonal Variation

By CHARLES P. WHITE, PH.D.

University of Pennsylvania

SOME commodities such as bread, meat and sugar, are consumed at a regular rate throughout the year, while others, like fireworks, toys and walnuts have their entire sales concentrated within a few days or a month at most. Practically the total supply of cotton or wheat becomes available for market within a six weeks' or two months' period; pig iron, copper, and sole leather, on the other hand, are produced at a rather uniform rate throughout the year. Irregularity, whether of production or consumption, has an important bearing on price, and where either occurs we find that wide fluctuations exist. Very often it is possible to reduce such price variations by bringing either production or consumption under greater control, but when this is done, emphasis is usually placed on factors other than price. In studying the causes of seasonal variation and plans for stabilization, it is necessary, therefore, to take a broad view and consider not merely price stabilization, but continuity of operation, regularity of employment, and uniformity of profit or dividend policy as well.

## CAUSES OF VARIATIONS

The main cause of seasonal variation, either of demand or supply, is the weather, and the best example on the demand side is clothing. As the summer months approach, white is substituted for the darker colors, straw hats replace felt, and heavy woollens give way to tropical worsted and other lighter fabrics. Demand for fuel and shelter also varies widely within the year as shown by sales of coal and gas.

Automobiles have their greatest sale during the early spring months and the lowest during December and January, which correspondingly stimulates or retards sales of gasoline. Each variety of sporting goods has its individual seasonal variation, and while the total amount of food consumed probably varies only slightly, there is a considerable change in variety from season to season. But although weather conditions are fundamental, this natural cause is greatly strengthened by custom or tradition. Demand shifts from felt to straw hats as the summer months approach due to the desire for lighter and cooler headgear, but the sacredness of a particular day for making the shift is due to the ingenuity of salesmanship and the force of advertising. The traditional closing of the football season on Thanksgiving was originally based on unfavorable New England weather, but the practice now is almost as universal in the south as the north. Cranberries and turkey are inevitably associated with Thanksgiving; nuts, toys, jewelry and certain types of candy have their greatest sales at the Christmas season; and greeting cards, until recently, were used almost exclusively at the Holidays and Easter.

## VARIATIONS IN SUPPLY

Climatic or weather influences are also responsible for many variations in production, and the outstanding example is agriculture, for the supply both of crops and livestock varies according to season. The output of grains, fruits, and vegetables is restricted to rather narrow periods be-



cause temperature and rainfall set definite limits on the growing season. Production of eggs increases to great heights during April and May and declines almost to zero during December and January, while the supply of milk reaches such volume during the spring and early summer months when grass is abundant that milk companies face a real problem in disposing of the surplus and are obliged to discriminate in price between regular and casual producers. Even the production of hogs and sheep, and to a lesser extent, cattle, follows a seasonal trend. Receipts of livestock at central markets are determined, in part, by the abundance or scarcity of grain and grass, and in part, by arrangement of the breeding season so that the young are given a good chance of survival during favorable weather conditions.

Industries which use agricultural products, as raw materials, tend to show similar variations. The meat packing industry, for example, adjusts its operations by sending great quantities of meat to storage during the months of excess supply, the average increase in storage stocks from March 1 to July 1 being about 20 per cent. A similar policy is followed in the egg packing industry, more than 40 per cent of the year's pack being made during April when the supply is greatest. An even better example is the canning industry, for there operations are definitely restricted to the period when vegetables and fruits are harvested. Although the raw material is much more durable, similar concentration exists in the milling industry. In 1926 and 1927 monthly production of flour increased 40 per cent or 50 per cent from the low figures in April, May, and June, to the high in August, September, and October, and the per cent of total capacity of mills in operation rose from 45 per cent to around 65 per

SEASONAL VARIATIONS IN CONSUMPTION \*  
FIG. 1.—COTTON

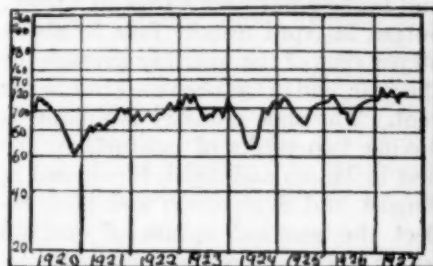
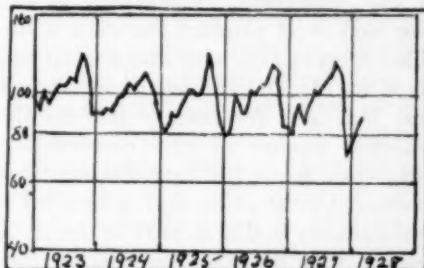


FIG. 2.—CIGARS



\* Source.—"Survey of Current Business."  
Relative numbers, monthly average, 1923-1925  
taken as 100.

cent.<sup>1</sup> The same tendency is evident in the sugar industry, since sugar melting, in the months of highest production, March to June, are often twice as great as those of December and January.

There is also considerable variation of production in industries unconnected with agriculture. Sometimes this is due to weather conditions, at others, it merely indicates that the producer is attempting to adjust his operations to variations in demand. Thirty to thirty-five per cent of the year's output of automobiles is produced during the three months, March, April, and May, not because that season is so much more favorable to production but because the bulk of sales are made during the spring and early summer. Production of bituminous coal might well be carried on at an even rate throughout the year,

<sup>1</sup> Survey of Current Business, February, 1928.



but because consumption for industrial and heating purposes varies so widely, output in April usually falls to about 80 per cent of the monthly average for the year, and in October rises to 115 per cent. The shoe industry is unique in having two peaks of production, the first in March and April, the second in August and September; and both reflect the seasonal nature of demand which has been greatly encouraged by merchandising and advertising policies of the producers. Variations in the iron and steel production, with a decided drop in February and a spurt upward in March, and again in August and October, are mainly due to the seasonal nature of the construction industries, while the very distinct drop in cement production during December and January is due in part to the same reason, with unfavorable weather conditions as a direct contributory cause.

#### EFFECTS OF FLUCTUATIONS IN PRODUCTION

Because of these fluctuations, the producer is often placed at a distinct disadvantage. Concentration of production leads to rush work, night shifts, overtime, and extra wages. There is a tendency toward less careful planning of production, more materials are wasted, labor efficiency tends to decline, and finished products are less carefully inspected. With the passing of the peak of production, plant and equipment stand idle while fixed or overhead charges pile up a heavy burden against the industry. Workers are forced to adjust yearly expenditures to an income received during a brief period or to expand insufficient earnings by finding another job. Labor turnover is increased as workers are laid off, and the expense of hiring and training a new force when production is resumed adds another item to the list of mounting costs that ultimately find their way into

SEASONAL VARIATIONS IN PRODUCTION \*  
FIG. 1.—COPPER—LITTLE VARIATION

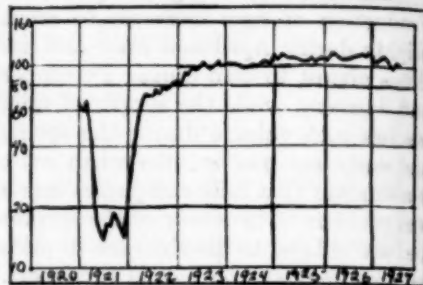


FIG. 2.—CEMENT

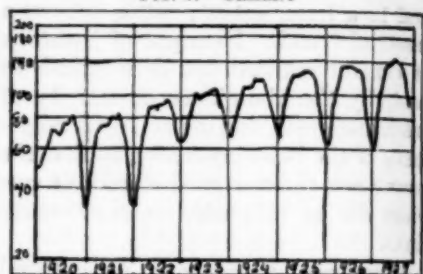
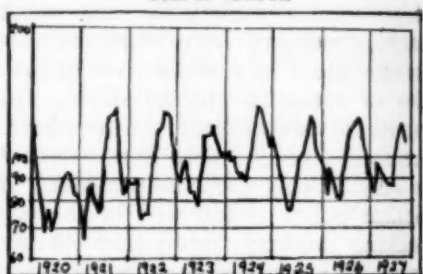


FIG. 3.—FLOUR



\* Source.—"Survey of Current Business." Relative numbers, monthly average, 1923-1925 taken as 100.

the price to be paid by the final consumer. Even if the prices are maintained at a steady level through the year, the consumer has a distinct interest in stabilizing production, for this uniform price will be higher than would be necessary under a policy of continuous production.

#### REMEDIES

The methods used to reduce or eliminate seasonal variations must vary with

the cause. In agriculture the problem is primarily one of marketing rather than production. The only time to "make hay" is while the sun shines, for temperature and rainfall are not subject to human control, and soil limitations prevent extension of the growing season by raising a part of the crop in sections where the growing season is longer, or occurs at a different time. By artificial culture in hot houses, and greater production in southern and coastal states, it is possible to double and triple the periods during which certain fruits and vegetables are available, but these methods can never be applied to the great staples such as cotton, wheat or corn. Greater speed in transportation, improvements in refrigeration and modern developments in scientific canning and cold pack methods all have tended to stabilize prices of milk, vegetables, and fruits. Tradition is a powerful influence in agriculture, and investigation would probably show many instances where seasonal production and marketing of livestock is not based on sound reasons, but when all is said and done, the main causes are natural and too powerful to be overcome.

#### ISOLATING THE CAUSES

Concentration of the year's production in a certain season may be due, in the manufacturing industry, to transportation difficulties, or as more often happens, it may reflect the producers' attempt to meet a distinctly seasonal demand. The first step, therefore, is to make a thorough investigation to determine the cause. This often shows that the obstacles to continuous production are fancied rather than real, and based on custom which has never been examined. Until recent times workmen in the building trades were employed only about 75 per cent of the time, and while the fact was deplored,

it was taken as a matter of course and excused on the grounds of inclement weather. Investigation showed, however, that seasonal variation was almost as great in the south as in the north, and careful study of the period 1890-1919 indicated that in the north a winter building program was impossible, due to temperature, only about fourteen days.<sup>2</sup>

In other lines a variety of reasons are given to explain variations in production. Sometimes it is said that transportation of materials is interfered with at certain seasons, that the quality of materials is adversely affected by too much or too little humidity, or that labor efficiency is lowered by excessive heat or cold. Some of these are undoubtedly true, but many of them would probably fare no better in an examination than did the building industry. Once the exact importance of each influence is known a suitable remedy can nearly always be found. Cooling or ventilating systems are a possibility in restoring labor efficiency, and through experimentation it is possible to secure materials possessing almost any quality desired.

When unevenness of production reflects unevenness of sales, different policies must be followed. Concentration of orders, however, does not always mean that consumption is equally concentrated. In an industry producing industrial goods, the tendency toward a peak in orders near the end of the year was accounted for by the more intensive effort of salesmen to achieve their quota. Sometimes concentration of orders is irregular from year to year because distributors or jobbers desire to speculate, ordering far in advance when

<sup>2</sup> For further information on this point, see "Seasonal Operation in the Construction Industries," Report of a Committee of the President's Conference on Unemployment. 1924, McGraw Hill.

a rise is expected, and postponing purchases when a decline is anticipated. If use by consumers is steady and uniform, the manufacturer may often find relief by selling direct to retailers, as has been done by Procter and Gamble, National Biscuit Company, Heinz's, and Colgate's.<sup>3</sup>

Another influence that in recent years has tended toward concentration of orders is the practice of hand-to-mouth buying whereby the dealer purchases in small quantities in order to keep his investment low and speed up the rate of turnover. Fear of price changes between ordering and delivery dates, and unwillingness to trust their own judgment with respect to style and color, or even the total amount that will be desired have led many dealers to postpone orders to the last minute and have forced the manufacturer either to accept alternate periods of idleness and peak production, or to assume the risk himself. Experience, however, has shown that much can be done to change the dealer's practice. Reluctance to order far in advance often arises out of unpleasant and costly experiences when goods were overstocked, therefore, every effort should be made by salesmen to prevent over ordering. Much can be done, also, in protecting the dealer against loss due to price changes. Some companies follow the practice of never raising the price, although prices rise after the order is received, but before the goods are delivered, and at the same time, always lower the quoted price if a decline occurs before the ordered goods are delivered, believing that occasional loss is more than offset by the confidence and good will established in the dealer, which results in greater regularity of ordering.

Proof that orders can be secured long in advance of actual delivery has been

<sup>3</sup> Feldman, "Regularization of Employment," p. 188-190.

furnished by Professor Feldman in his study on "Regularization of Employment." One interesting example cited is that of the Ives Manufacturing Company, maker of toys, whose salesmen formerly were idle the first six months of the year. Finally, an innovation was made and salesmen were sent to solicit orders in June. The success achieved led to successive advances in the starting date so that now dealers begin to place orders in January for toys that will be offered to the public the following Christmas. The Denison Company has followed the same policy with regard to jewelry boxes which have their greatest sale at the Christmas period. Solicitation of orders begins in January, and now about 65 per cent of the total orders for the year are received before July 1. Such a system not only aids in solving one phase of the labor problem but is also in line with the best principles of scientific management, since it permits minute planning of production. It is also claimed that the dealer is able to order more intelligently with the experiences of the past season fresh in mind.

If fluctuations in orders are really due to fluctuations in the rate of consumption, a number of alternatives are open to the producer. First, he may accept the rate of consumption as natural and incapable of being changed, and try to adjust production to it. If the quantity demanded varies little from year to year, if the product is rather highly standardized as to style, quality, and size, and is durable so that it may be stored without deterioration, production may be carried on at a uniform rate throughout the year, and stocks built up which will be drawn upon during periods of large demand. Second, he may decide to change either buying or consuming habits of consumers, so that demand will be distributed more evenly throughout the year. Third,

the dull periods that remain after the first two methods have been utilized, may be filled by producing commodities whose peak of demand coincides with the trough in sales of the regular commodity.

The policy of warehousing and storage, it is obvious, cannot be adopted at all in some industries, and in others can be carried out only to a limited degree. To the extent that it can be practiced, it protects the laborers' interest by providing steadier employment, but it may offer little or no advantage to the consumer, for costs of warehousing plus occasional losses to the producer of over-production or misdirected production may offset the gains resulting from more continuous production, so that the final price remains as high as before.

Attempts to alter buying or consuming habits may include actual changes in the product itself, changes in sales policies, the use of trade slogans, advertising, and a multitude of publicity methods that now exist for overwhelming the consumer. Which of these will be most effective varies, of course, with the case. Most people recall that in the early days of the industry the automobile was considered a summer luxury only, and was locked up in the garage for several months during the winter, a practice in striking contrast with the year-round use that now prevails. Manufacturers realized that a part of the objection to winter use was well founded and set out to find remedies. Radiator trouble has largely been obviated by the use of automatic heat regulators or replacement of water with fluids of low freezing points, such as alcohol or glycerin, and discomfort of the rider reduced to a minimum by introduction of the closed car and the use of heating devices. To eliminate minor mechanical troubles resulting from low temperatures, the leading manufacturers subject each part to

rigorous and lengthy tests under actual operating conditions.

Along with improvement of the product and removal of the obstacles to winter use, there has been a change in merchandising policy. Producers realize that there will always be much greater use during the summer months, but they attempt to reduce the spring-time peak in the demand by the use of advertising and by inducing the distributor to put forth greater sales effort during the off season. Extension of credit has also been used to encourage advance ordering by the distributor, which tends to relieve the manufacturer of storage difficulties and thus make continuous production more possible.

#### MARKETING METHODS

Sales may be distributed more evenly throughout the year by finding new uses for the product which come at different seasons, by finding new users in localities with seasons that differ from those where the product is already being sold, or simply by overcoming the reluctance of the consumer to buy during the off-season. The possibilities of the first two methods are rather limited, but examples are found where the export market has proved a valuable outlet for farm machinery, furs, and underwear.<sup>4</sup> Feldman cites a candy manufacturer who overcame the summer slump by developing the summer resort market.<sup>5</sup> Atkins tells of a mail order house that cultivated the summer hotels with great success, and of a book dealer who secured greatly increased sales by preparing assorted packages of books for vacation use.<sup>6</sup>

The most obvious methods of overcoming reluctance to buy are increased

<sup>4</sup> "Solving the Problem of Seasonal Goods," Paul M. Atkins, *Administration*, October, 1921, p. 480.

<sup>5</sup> *Op. cit.*, p. 178.

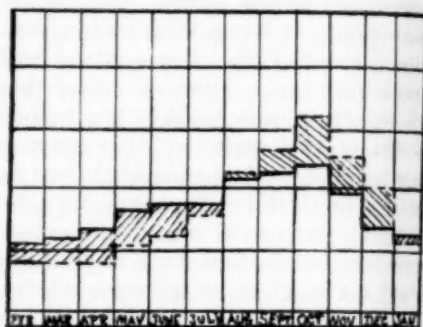
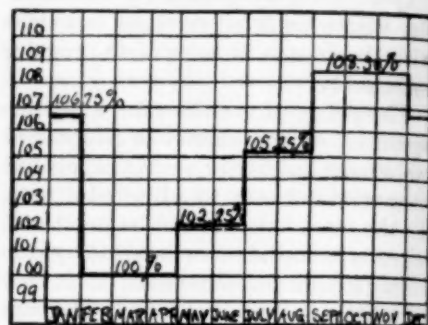
<sup>6</sup> *Op. cit.*, p. 477.



advertising and greater sales effort. Sales effort may be increased by putting on more salesmen, by paying higher commissions for sales during the off-season, or by the more usual practice of conducting contests among salesmen, which has been followed with success by the Burroughs Adding Machine Company. Although advertising and sales effort are part and parcel of the same program, the greatest credit for making demand more uniform is usually given to advertising, and the products which are said to have benefited by it are legion. Within the lifetime of many people ice cream has passed from a concoction designed for warm weather consumption to a year-round food. Coca-Cola, citrous fruits, and B. V. D's, now boast large sales throughout the year, while the seasons during which walnuts, furs, woolen stockings, sweater waists and reed furniture are sold have been extended greatly.

One merchandising policy that has been given a trial by many concerns is that of stimulating dull-period sales by a reduction in price. In the service or entertainment line we find the price differential on theater tickets for matinee performances, night message rates offered by telephone and telegraph companies, and the off-peak rates quoted by gas and electric companies. In the commodity group one of the first industries to make use of this device was the anthracite industry which, in 1900, established the practice of granting a discount on summer sales of coal. Since then there has been a remarkable decrease in the number of days of idleness in the industry, and no less an authority than the United States Geological Survey believes that considerable part of it is due to the summer discount. The American Radiator Company some years ago inaugurated a schedule of graduated prices with a range of 8 per cent between prices in the

PERIOD PRICE SCHEDULE OF THE AMERICAN RADIATOR COMPANY \*



RESULTS OF ADJUSTING THE SEASONAL VARIATION OF PRODUCTION AND SALES IN THE AMERICAN RADIATOR COMPANY \*

\* Source.—“The Regularization of Employment” by H. Feldman, pp. 188-189. The broken line in the second chart indicates the seasonal variations in shipments for sixteen years prior to 1923; the solid line the diminished variation in 1923.

peak-load period and in the month of smallest sales, and succeeded in flattening out the sales curve very appreciably, as shown in the accompanying chart. In addition to these concerns, Feldman states that the Kalamazoo Stove Company grants credit concessions and lower prices during June, July, and August, that the Plymouth Fur Company of Minneapolis has used the plan with success, and that a fertilizer company stimulated sales to farmers by low prices during the fall.



## DIVERSIFICATION OF PRODUCTION

The third major policy referred to above is that of making different products at the period when production of the main line is low. The best example of this, although not strictly manufacturing, is the old reliable combination of the ice and coal business. The purpose underlying all such plans is to reduce production costs of the main product, or more broadly, to increase total profits of the business, by avoiding the periodic disruption of the labor organization, by eliminating the costs of high labor turnover, and by distributing overhead costs over a greater output. Many problems are encountered in finding products that can be adjusted to the main line, some of the requirements being that the secondary product can be produced when manufacture of the main product is at a minimum, that it require a similar type of labor and equipment, otherwise additional costs will be too great, and that marketing can be done through the already existing organization.

The methods used to put this plan into operation are numerous. The simplest is that of making a slight modification in the main line in order to reach a different class of users, as practiced by talking machine companies in the making of "portables," and by woolen companies in the introduction of open-knitted jackets for summer use.

A more extensive practice is the use of unrelated products as a side-line or "filler" for the idle periods. A particularly good example of this is the canning industry. The Columbia Conserve Company of Indianapolis, which in 1918 canned less than 7 per cent of its total output during the first six months of the year, increased the proportion to 20 per cent in 1920, and to 33 per cent in 1923 by the addition of soups, while

other concerns have found baked beans and hominy acceptable "fillers." A window screen manufacturer eliminated a six months' shutdown by making game boards for the Christmas trade, a firm manufacturing farm and garden implements offset a similar slump by making sleds, a producer of milk cans turned to coal scuttles, a manufacturer of baseball bats to hockey sticks and finally to chairs, a concern making mechanical toys found considerable success in electric fans, while manufacturers of reed and rattan furniture filled in the gaps by making baby carriages.

In some industries it is possible to diversify the whole line of production so that a large number of commodities are produced, with peaks in some lines offsetting the troughs in others. This is particularly true in the rubber industry where it is found that variations in sales of "good weather" products, such as sport goods, tires and tubes, tend to be counterbalanced by opposite variations in "bad weather" products, such as raincoats, boots, and rubbers. Manufacturers of farm implements have avoided extreme variations by producing a complete line beginning with tools used in preparation of the soil,—plows, harrows, discs,—continuing with others for use during the cultivation period, and ending with various types of harvesting machinery, while some have gone further and added tractors and other power equipment. The Dennison Manufacturing Company has long been known as an exponent of extensive diversification, and since the war the Winchester Arms Company has added flashlights, batteries, skates, fishing tackle, carpenters' tools, and complete line of steel cutlery (including pocket knives, scissors, razors, etc.), to its existing line of rifles, small arms and ammunition.

## SUMMARY

It can be seen from this survey that the so-called problem of seasonal variation is, in reality, composed of many separate problems. If fluctuations in the supply of a commodity are the result of natural obstacles to production, they will nearly always be accompanied by fluctuations in price. The range of fluctuations may be reduced by storage, if the commodity is durable, or by expending money and effort to overcome the natural obstacles to production, but since both methods are expensive and tend to raise the average price, they will be undertaken only if the variations are extreme. When variations in supply are the result of an irregular rate of consumption, fluctuations in price may not exist at all, or if they do, they cease to be the most important consideration. Because production is not continuous, average prices to the consumer are higher, for he must pay the overhead charges in-

curred during idle periods. Profits to the manufacturer are apt to be low because he is unable to pass on all costs to the consumer. The interest of the worker, however, is the most direct of all, for the cost to him consists of alternating periods of rush time work and enforced idleness, insufficient yearly earnings, frequent change of jobs, and the continual danger of unemployment.

Elimination or reduction of seasonal variations, therefore, will achieve a three-fold result: for the consumer it will mean either more uniform, or lower average prices; to the producer, larger and more regular profits, and to the worker, as well as to society at large, greater regularity in employment, and oftentimes, higher earnings. In selecting the remedies to be used, any one of these advantages may be emphasized. Experience of companies that have struggled with the problem shows that the possibilities are almost without limit.

## Industrial Forecasting

By CHARLES P. WHITE, Ph.D.

University of Pennsylvania

FROM the standpoint of sales, manufacturing industries fall into two general classes—those that produce only in direct response to orders, and those that anticipate orders, manufacturing for stock and storing the goods until they are actually demanded. Between these two extremes there are many variations. There are few concerns, except those making very costly articles subject to considerable variation as to size, material, style, etc., which do not attempt to keep on hand a small supply to meet sudden demands, just as there are few firms that manufacture for stock without regard to the number of orders being received. Although neither policy is followed exclusively, the classification is useful in showing how the problem of adjusting production to consumption varies among industries. As already indicated, the policy followed by any given concern depends largely on the nature of the product. Production for stock, in anticipation of demand, is likely to prevail if the commodity is a staple or necessity which satisfies fundamental needs, if the value per unit is small, if the article is subject to standardization and not dependent to any large degree on personal style or taste.

The big problem facing any industry which must anticipate orders is simply, How much shall we produce? The easiest and crudest way of answering this question is to say that last year's production shall be increased by a certain amount, which may be determined either by reference to the rate of increase in the past, or by an arbitrary decision as to how much the expansion

should be. Such rule-of-thumb methods, however, are seldom satisfactory, for they completely disregard factors external to the business itself. A concern following these methods will at times find itself loaded down with goods which can be sold only by making extensive price reduction, or by engaging in costly advertising and merchandising campaigns; at others, huge sales are lost simply because the goods are not on hand when wanted. To reduce the risk involved in the use of such arbitrary methods, many firms call on the sales force to estimate sales, taking into consideration past records of the company, general business conditions in each district, and the severity of competition to be faced. Because of their intimate knowledge of conditions gained from first-hand contact in the field, salesmen are in a position to make estimates which are much more accurate than those resulting from the cruder methods. Salesmen, however, are prone to be extremely optimistic, and often arrive at figures in excess of actual probabilities.

For this reason and because such estimates do not take into consideration the physical or financial problems connected with producing the goods, it is necessary that they be examined carefully by those in charge of production to determine their feasibility from the standpoint of plant and machine capacity, labor supply, cost of materials, etc. Although both plant and machine capacity prove ample, the program may not appear practicable because of rising material costs, or labor shortage. Again, labor and materials cost may

constitute no hindrance, but to achieve the required output, it may be necessary to expand both plant and machine capacity. Whether or not this is desirable can be determined only by reference to the financial status of the company—the amount of surplus available, the existing financial structure as indicated by the proportion between stocks and bonds, the total cost of the proposed expansion, the present condition of the money market, the possibilities as to future changes in demand for the product, etc. By subjecting estimates of the sales force in this way to careful scrutiny by representatives of both the production and finance departments, it is possible to provide a unified plan for the firm as a whole, secure coördination between the various activities and reduce the chances of over- or under-production to a minimum. If such procedure were followed consistently by the majority of firms, both production and prices would undoubtedly be more uniform than they are at present.

In recent years, however, even the degree of accuracy attained by this method has not proven sufficient for some of the larger and more progressive firms. The existence of large excess productive capacity, declining prices, and a narrowing profit margin have all been important influences in bringing about a change in method.

#### THE DEVELOPMENT OF SCIENTIFIC MANAGEMENT

Of equal importance has been the rapid development of scientific management in industry. Beginning with Taylor, the movement was first concerned with the details of production, and his early disciples busied themselves in finding the "one best way" to perform an operation by elaborate time and motion studies, and in determining the qualities required in mate-

rials for various products and machines. Later the movement was widened in scope, with emphasis placed on planning for all phases of the industry. This necessitated closer coördination of production, finances and distribution, with some device or method to assure continuous centralized control. The method used is the budget.

#### THE INCREASE IN BUSINESS DATA

Along with the growth in scientific management came a phenomenal increase in the collection and dissemination of business data. At first most of this work was performed by private services, who recognized the need for such data and supplied them to subscribers. Next came trade associations made up of firms who, in spite of the fact that they compete vigorously among themselves, nevertheless decided they have certain interests in common and recognized the advantages of collecting by coöperative action information which could be assembled by individual firms only at prohibitive cost. With the establishment of the Federal Reserve System a new semi-public agency came into existence that was vitally interested in business data. In order to exercise the power over credit delegated to it by law, the Federal Reserve Board required more detailed and accurate information regarding trade and business than was available in any existing form, and soon found that it must itself undertake the task of assembling such data. As a result, a great mass of information on production, sales, employment, prices, stocks of goods, orders, etc., is made available periodically both for the country as a whole and for the various federal reserve districts. Some years later an even more comprehensive attempt was made by the Federal Government, upon the initiative of Herbert Hoover, Secretary of Commerce.



The immediate impetus to this movement was given by the legal restrictions placed upon certain types of statistical work engaged in by trade associations. The value of such work was recognized and the attempt was made not only to take it out of the realm of controversy by having the government assume responsibility for it, but also to broaden its scope to include much information which was not being made available to the public in printed form. While there are still many fields in which the data are inadequate or lacking entirely, still the situation is immensely improved over what it was as recently as the conclusion of the war.

#### THE DEVELOPMENT OF STATISTICAL TECHNIQUE

Coupled with this improvement in the completeness and accuracy of assembling business facts, has been the development of statistical technique of analysis, the greater part of which has grown out of interest in the business cycle. The recognition of the various types of business fluctuations—seasonal, secular, cyclical, and accidental—led to the development of means for isolating and measuring these different elements. The first step in the procedure as usually followed is the determination of the secular trend or the rate of growth. This may be done by “fitting a curve” to the original data which will show what the growth would be if it were not influenced by the other forms of fluctuations—seasonal, cyclical, and accidental. In determining the type of curve which best fits the data, a variety of methods may be used, ranging all the way from the free-hand method of simply drawing a straight line through the original curve as charted up to the use of elaborate mathematical equations used in fitting what are known as the Gompertz curve

and the Pearl-Reed curve to the more variable types of data.

Once the trend is established, the next step is to determine if the data vary according to season, and if so, to compute the extent of the variation. Here again a great variety of methods exists, for scarcely a year goes by without some new formula being presented, or modifications made in existing methods. Wesley C. Mitchell in his recent volume on “Business Cycles” refers to at least eight methods that have been used, and the list would be even longer if all variations of the different plans were recognized. As might be expected, the actual application of these formulae often involves several steps of laborious computation. We are not concerned, however, with the details of the methods used but with the results. For our purpose it is sufficient simply to recognize that it is possible, after finding the seasonal variation, to eliminate it from the original figures and leave only the cyclical and accidental fluctuations which may be expressed as deviations from the trend in actual quantities, or as is more often the case, as percentage deviations from trend. The stages passed through in arriving at this final result may be shown in the following diagrams taken from Prof. Harry Jerome’s “Business Statistics.” Figure 1 shows annual production and straight-line trends, Figure 2, deviations from trend in millions of tons, and Figure 3, percentage deviations from trend.

The greater part of this technique, as was indicated above, arose out of attempts not only to record and measure the business cycle but to forecast it. The elaborate studies made at Harvard, under the leadership of Prof. Warren M. Persons, to find the relationship between various phases of business activity, and to determine the extent to which they precede or lag



Fig. 1

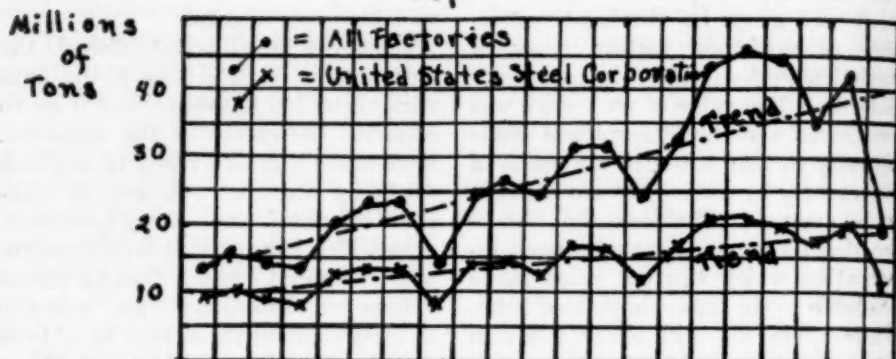


Fig. 2

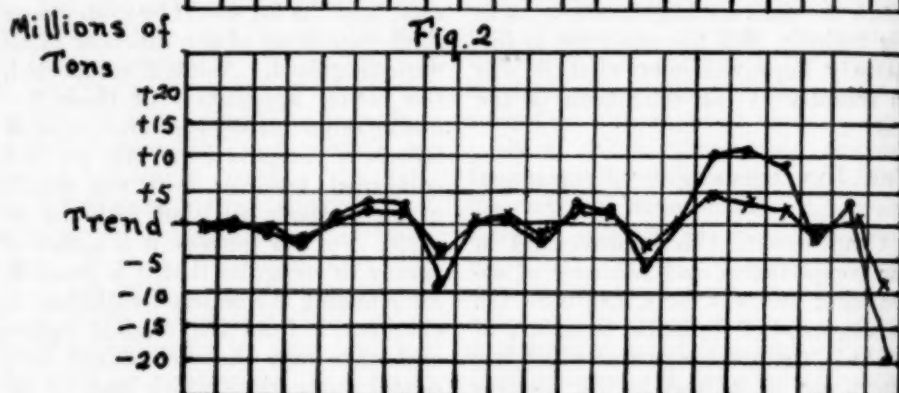
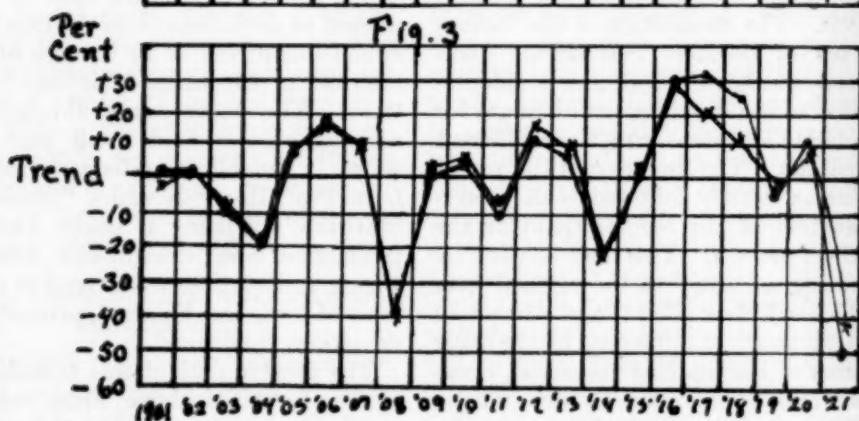


Fig. 3



CYCLES IN ANNUAL PRODUCTION OF CRUDE STEEL IN THE UNITED STATES, 1901-1921

behind each other are familiar to most students of economics, and need not be entered into here. As a result of the studies, three curves or series were established, one designated the index

of speculation, another the index of business or the "B" curve, and the third, the index of the financial situation in New York, or as it usually is called, the money curve. The original

purpose of the work was achieved, it was thought, by the selection of these curves, for it was found that in the pre-war period 1903-1914 the curve of speculation consistently preceded the business curve and the business curve almost invariably preceded the money curve, thus providing reliable information for use in forecasting.

The work of the Harvard group is of importance to the present study for two reasons: first, the publicity it received and the detailed explanation of the methods followed made it possible for business firms to adapt the technique to the study of their own businesses; second, the creation of the various indexes, particularly the "B" curve of business provided a ready yardstick for measuring the activity of the individual business in relation to business in general.

The disastrous break in prices in 1920, coupled with wholesale cancellation of orders, caught the majority of firms unawares, and the heavy losses imposed turned attention as never before to the control of production. With the constantly growing mass of business information and the more highly refined methods of analysis available, many concerns have set up forecasting methods which promise much in the prevention of over- or under-production and the variations in price which follow.

#### CLASSIFICATION OF FORECASTING

In his presidential address before the American Statistical Association on December 28, 1927, Prof. Edmund E. Day pointed out that there are three general types of prediction: prediction by analogy, by formula, and by analysis. The first method depends mainly on history. Existing conditions are found to duplicate in their various aspects those of some preceding period, and it is argued, therefore, that we may

expect results similar to those of the earlier period. The danger, of course, is that while surface conditions in the two periods may appear to be the same, fundamental changes may have taken place which completely destroy the chance of similar outcome. Because of its superficial nature, therefore, prediction by analogy is given little consideration. In recent years the main interest has been centered in the second method, and innumerable attempts have been made to discover an unfailing formula which will tell us what the future will be. Although more precise than the first, this method is still prediction by analogy, as has been pointed out by F. E. Richter. The formula, however derived, is based on happenings in the past, and the assumption is that relationships which have been found to exist will continue. The third method, while it by no means ignores the lessons of history nor denies the usefulness of formulae within limits, places main reliance upon careful observation and weighing of all factors, being particularly on the lookout for those broad social and economic changes which might alter the customary relationships. This classification is useful in pointing out the various methods that may be used in forecasting, but it does not follow that any one method will be followed exclusively by a given firm. In practice, the system finally adopted is likely to be a combination of the three, main reliance being placed now on one, now on another, as conditions seem to warrant, with a willingness always in evidence to change to the scheme which gives the best results. With these distinctions in mind let us see what has actually been done.

#### THE OBJECTIVES IN FORECASTING

In forecasting the objective of any firm is two-fold. First, it wants to determine in a general way at the begin-

ning of the year what the prospects are for the entire twelve months ahead. Will the total business be larger or smaller, and what will be the extent of the change? As soon as the total is established it is possible to begin long-distance planning. If an increase is expected immediate steps can be taken to expand the plant, repair old and install new machinery, provide the necessary materials, build up the laboring force, and strengthen the financial position of the firm. When a decrease is anticipated an attempt will be made to keep inventories both of materials and products at a low figure, the labor force gradually reduced, and increased advertising and selling effort put forth to offset the decrease as far as possible. In either case, the year's production must be broken up into quarterly and monthly quotas, and an attempt made to equalize production by producing for stock during the months of low demand. The second objective is to anticipate changing currents of business as they occur throughout the year, in sufficient time to alter plans which are already in operation. What constitutes sufficient warning will vary with the length of the manufacturing process.

Which of these two objectives is the more important will depend both on the nature of the industry and the kind of the product. If the labor used is highly specialized, requiring considerable training on the job, if the manufacturing process is of considerable duration, or if the supply of raw materials is seasonal in nature, then there is real necessity for an estimate for the year as a whole, but if the opposite conditions hold true, failure to estimate twelve months in advance will not be so serious.

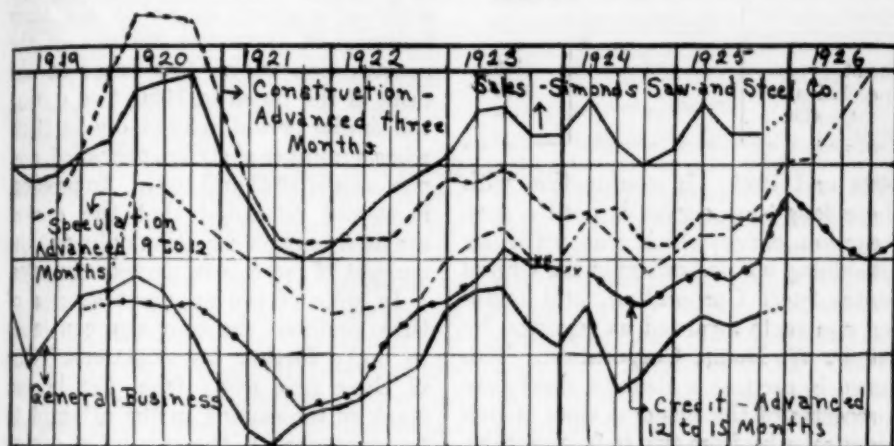
In attempting to make the twelve-month estimate the first step is usually the construction of an index of sales of

the business. In some firms the number of different products turned out runs into the thousands (as, for instance, Henry Disston and Sons with 20,000 items, Walworth Company with 23,000, or the Graybar Company with 60,000), and variations in sales of one product may bear no relationship to those of another. In this case, an index of total sales is not likely to show the true situation, and it becomes necessary to break up the total output into groups of products of the same type which show similar movements. Once the grouping has been accomplished it is possible to select one commodity as representative of each group and make an index of its sales or to construct an index of total sales for each group.

Since the purpose of the index is to permit comparison with other indexes, it usually will be necessary to determine a line of secular trend and eliminate seasonal variation, if any exists, by the methods mentioned above. When this has been done the remaining fluctuations, representing cyclical and accidental variations only, may be expressed as deviations from trend and compared with similar deviations in other series. In selecting the series with which comparison is to be made, a causal connection is sometimes assumed, as when the Simonds Saw and Steel Company assumed that there would be a causal relationship between the amount of credit available and company sales. This method is of advantage in that it may reduce the number of comparisons which must be made, but it is not at all necessary that a causal relationship be proven, or even that there be grounds for believing that it exists; the important thing is to find if there is any correlation between the two series. Sometimes it will be found simply by observation that two series fluctuate in unison; usually no

such direct relationship is apparent and it becomes necessary to compute coefficients of correlation in order to determine with greater accuracy the degree of relationship. Since fluctuations in one series may precede or lag behind those of another, it often is necessary to compute the correlation for lags of varying length to discover the average rate of lag. When this procedure has been completed, we are in a position to say that, on the average, variations in

fact."<sup>1</sup> Joseph H. Barber, Assistant to the President of the Walworth Company, admits that such a curve would be highly desirable, but says, "We have not been able to find it."<sup>2</sup> F. E. Richter, of the Bell System, states, "We place only the minimum of confidence in forecasting curves,"<sup>3</sup> giving as his reasons that none are infallible, many have failed in the last few years, that they do not give help for a long enough period in advance, and that it is



SALES FORECASTING CHART USED BY THE SIMONDS SAW AND STEEL CO.

The Credit Curve is Advanced 15 months, the Speculative Factor 12 months and the construction Forecaster 3 months ahead of Period Actually Represented by the Curves.

sales tend to precede or lag behind variations in the particular series by a certain period, say twelve months.

#### THE SEARCH FOR MECHANICAL FORECASTERS

Attempts to find series which forecast company sales by as much as twelve months or longer have not been very successful. L. W. McChesney, Vice-President and Manager of the Primary Battery Division, Thomas A. Edison Industries, asserts that "it is fallacious to assume that the exact production of a manufacturing plant can be predicted with any great degree of accuracy a year in advance of the

difficult to determine whether a given turn is a major or a minor turn.

In spite of these objections, some companies claim that good results have been secured by use of such curves. The Simonds Saw and Steel Company, referred to above, has used two curves, one representing credit, and one speculation. For the period 1919 to 1923, changes in the direction of the curve of speculation preceded similar changes in company sales by nine months, but for

<sup>1</sup> *Management and Administration*, February, 1923, p. 172.

<sup>2</sup> *Administration*, November, 1924, p. 479.

<sup>3</sup> *Journal of American Statistical Association*, *Proceedings*, 1928, p. 118.



1924 and 1925, the lag was extended to twelve months. Changes in the credit curve (money rates reversed) during the period 1919-1923 preceded company sales by twelve months, which was extended to fifteen months during

Forecaster	Number of Quarters in which Forecaster Indicated Movement of Sales	Per Cent of Quarters in which Forecasts Indicated Sales
Credit.....	22	91.6
Speculation....	20	83.3
Construction....	17	70.8

1924 and 1925. In conjunction with these long-time curves is used a construction curve which was made by combining unfilled orders of the United States Steel Corporation, and building contracts awarded as reported by the F. W. Dodge Corporation. This curve is used as a definite short-time forecaster of the business since it precedes sales by from two to four months. In actual practice, all three curves are plotted on the same chart, each one being projected into the future the number of months which it is supposed to precede sales. Construction, during 1926, was therefore advanced three months, speculation twelve months, and credit fifteen. The chart on page 115 illustrates the method used.

In vouching for the accuracy of the method, the company states that out of the twenty-four quarters during the six-year period 1920-1925, all three forecasters moved in the same direction in fifteen quarters, and in fourteen of these sales moved in the direction indicated. The single exception was in 1920, when sales did not decrease until six months after the decline in general business. In seven other quarters, sales moved in the same direction as

credit. The summary for all forecasters is given in the preceding table.

The greatest tendency toward divergence between sales and forecasters occurs at critical periods of the business cycle. Of the two failures of the credit curve to forecast accurately, one came in 1920, the other in the first quarter of 1924. Two of the failures in speculation came at the peak of the boom in 1920, one at the turn from depression in 1921, and one in 1925 which was so slight as scarcely to justify the term failure. Of the seven failures of the construction curve, two came at the peak of the boom in 1920, two during the similar period in 1923, one in 1922, when a number of strikes prevailed, and one each in 1923 and 1925. In passing, it should be noted that the curves are used to show direction only, not the amount of increase or decrease in sales.

In spite of the apparent success of these methods the company continues to make further investigations. One of these gets away from the beaten track of forecasting in the attempt to tie up changes in the amount of saving with company sales. The reported increase in deposits of savings banks is stated in terms of national income as reported by the National Bureau of Economic Research, and then compared with an index of company sales, as follows:

SAVINGS BANKS OF THE UNITED STATES

Year	Increase in Deposits in Millions of Dollars	Increase in Deposits per \$100 of National Income	Simonds Saw and Steel Company Sales Index
1922....	1163	17.62	70
1923....	716	9.30	99
1924....	542	6.86	92
1925....	625	7.26	95
1926....	534	5.93	100



In interpreting this table, the great increase in sales in 1923 is attributed to the large savings in 1922. On the other hand, "greatly reduced savings or a comparatively small increase of savings in a very prosperous year like 1926 seems likely to be followed by a falling off in business the next year. Greatly reduced savings in a year of depression is to be expected—because of the great amount of unemployment. If the small savings of a year of depression are followed by increased savings the next year, it has indicated since 1920 that the second year after the depression will be one of very greatly increased prosperity."<sup>4</sup>

On the face of it, such a method seems to hold many pitfalls. In the first place, conclusions based on such a short period are rather questionable. Again, changes from savings banks to other agencies for saving might give an entirely false idea of the amount of saving taking place, and there might be also considerable room for argument as to whether a certain year should be considered one of prosperity or depression. In spite of these objections, the suggestion opens up a fruitful field for investigation.

#### OTHER ATTEMPTS

In other companies the attempt to find mechanical forecasters, or curves which forecast a year in advance has not met with much success. The statistical organization of Henry Disston & Sons compared their sales curve with a number of other curves such as Harvard Business Curve, Manufacturing Production Index, Total Contracts Awarded, Real Estate Transactions, Lumber, Speculation, etc., only to find that it either led the others by six months, or ran in phase with them.<sup>5</sup> The Walworth Company discovered

that sales of a representative product "X" fluctuated in close harmony, both with the Harvard Business Curve, and with Carl Snyder's index showing the average volume of trade, but were not preceded by movements of these curves. Somewhat similar results were secured by the Graybar Company and Eastman Kodak Company.

As a result, the practice now in many companies in making a twelve-month forecast is about as follows: First, accumulate as much of the available information concerning the prospects for general business in the coming year as is considered necessary in order to reach a definite conclusion as to what business activity as a whole is going to be. Second, study records of the company to see how sales, production, etc., have fluctuated in the past in relation either to general business or to particular phases of it, such as manufacturing, production, car loadings, bank clearings, etc. After analyzing these facts to discover any unusual features which alter the customary relationships, and after allowing for changes in the policy of the company such as additions to plant capacity, changes in number of outlets, or other methods of distribution, it is possible to set up estimates to serve as reasonably safe guides for production. They will never be infallible; at times their accuracy will be destroyed by wars, earthquakes, Mississippi floods and other disasters, but, fortunately, these come but rarely.

#### RESULTS OF FORECASTING

Our main interest, however, is in the results of forecasting rather than its methods. Reference has already been made to the Simonds Company; the achievement of Henry Disston and Sons of Philadelphia, whose products are very similar to those of the Simonds Company, is interesting in comparison. The work of the Disston Company is

<sup>4</sup> *American Lumberman*, June 4, 1927, p. 49.

<sup>5</sup> *Bulletin of the Taylor Society*, April, 1926, p. 56.

carried on by three main departments or divisions, one which manufactures steel, another files, and a third, known as the saws division which produces three types of goods: (1) shelf goods or hardware, which is sold through jobbers, (2) mill goods, or saws for use in saw mills and wood-working establishments, and (3) milling or metal cutting tools. The latter two groups are sold direct. Following the phenomenal ups and downs of business in 1920, 1921, and 1922, officials of the statistical department set out to discover methods of forecasting such changes. A number of series were studied to see if any showed a high degree of correlation with company sales. Although none was found which could be followed exclusively, several series have proved useful because of the degree of relationship shown; one barometer, it is claimed, failed only twice in fifteen years to indicate the movement of sales, the third failure coming in April, 1927. At the present time, main reliance is not placed in any specific curves; the method used would fall in the third group of Professor Day's classification, which he termed "prediction by analysis." The prospects for general business activity in the coming year are gone over carefully, company records are studied, and after changes in policy of the company have been considered, an estimate for total sales is established. Later this total is broken up by groups of products, and by main products in each group, and these in turn broken up into estimates for each state. These state figures are used not only to establish sales quotas, but also as a means of verifying the total estimate. It can be readily seen that no hard and fast rules are followed. There is no one formula that an outsider could use and achieve similar results. In the words of Mr. J. L. Stone, who is responsible for the estimates,

"The most important single factor in the system is intimate knowledge of the organization."

Judging by the results secured, the methods certainly may be considered successful. As indicated above, the estimates for the coming year are prepared during September and October, which means that very little if any information regarding sales during the last quarter of the year is available. In spite of this handicap, a high degree of accuracy has been achieved as indicated in the following table:

PERCENTAGE OF ERROR IN ESTIMATES

Estimate of	1924	1925	1926	1927
Orders received...	5.06	3.21	7.00	8.00
Sales revenue....	.63	2.96	6.00	7.00
Expense.....	1.00	1.32	3.00	4.00
Exports.....	....	....	3.00	.90

#### ACHIEVEMENT IN THE EDISON INDUSTRIES

Another company which has made a good record is Thomas A. Edison, Inc. This company is engaged in the production of widely different products, the three most important being Portland cement, primary storage batteries, and Ediphones. Because of the widely different nature of these products, a separate forecast is made for each. The method followed is similar in many respects to that followed by Henry Disston & Sons, but more study is made of conditions which have a direct bearing on the demand for the company's product; it also should be classed as "prediction by analysis." Statements made by officials of the company show that a forecast of total sales for the year ending February 28, 1925—a forecast made twelve months in advance—was 91 per cent correct.<sup>6</sup>

<sup>6</sup> *Management and Administration*, June, 1925, p. 528.

For the calendar year 1924 the results in the various divisions were as follows:<sup>7</sup>

	Per Cent
Cement:	
Actual cost of cement in bins.....	99½
Production.....	95
Sales.....	96
Profits.....	92
Primary Batteries:	
Sales.....	97
Profits.....	98
Ediphone:	
Sales.....	94
Profits.....	93

#### THE GRAYBAR COMPANY

The Graybar Company, which until January 1, 1926, was known as the Supply Department of the Western Electric Company, is another concern which boasts a good record. As indicated above, this company manufactures about 60,000 items of electrical materials, consisting of outside construction material used by light and power companies, small power apparatus, wire and conduit and wiring supplies, incandescent lamps, electrical appliances, etc. Extensive studies of the expected growth in demand for these various articles have been made, secular trend and seasonal variation in sales of the various products computed in the orthodox way, and these related to the General Business Curve of the American Telephone and Telegraph Company (which represents the volume of activity in the leading industries). It is not clear the extent to which the final estimates are based on mechanical forecasters rather than judgment of all factors, but statements of officials tend to favor the latter method. The accuracy of the estimates, which "in most cases . . . were made about one year ahead of the actual results," is shown in the following table.<sup>8</sup>

<sup>7</sup> *Management and Administration*, July, 1925, pp. 11-14.

<sup>8</sup> *Harvard Business Review*, October, 1926, p. 44.

#### Percentage Estimates Differed from Actual

	(Per Cent)
1923.....	+0.5
1924.....	-8.5
1925.....	-2.0

#### EASTMAN KODAK COMPANY

Another concern which forecasts by the method of "analysis" is the Eastman Kodak Company. At first considerable reliance was placed in an index of employment, but in later years this did not prove so helpful as originally.<sup>9</sup> Now "future trends are projected on what the Army calls an 'estimate of the situation.' This is my judgment of what the future trend of general business will be and the relation of our sales to it."<sup>10</sup>

The results of forecasts are considered very helpful to the company, if we may judge by the continued expansion of the work. In 1925 only total sales were estimated; 1926 and 1927 estimates covered eight main groups of products, or 84 per cent of the total sales, and in 1928, 94 per cent of total sales. In making the forecast, estimates are given for each product for each month one year in advance. The estimates for the total sales have varied from actual sales as follows:

1925.....	+5.6
1926.....	+2.4
1927.....	+0.6
1928 (4 months).....	+2.9

With regard to individual products, wider variations are found, as shown by the following figures covering 1927:

Total sales within	1% of actual sales
1 product	" 1-2%
2 " "	" 2-5%
4 " "	" 5-10%
1 " "	over 10%

No product more than 28% from actual sales

<sup>9</sup> See page 12.

<sup>10</sup> Letter from Leonard Stapleton, Statistician of Eastman Kodak Company, May 12, 1928.

## SUCCESS OF THE WALWORTH COMPANY

One of the first concerns to go in wholeheartedly for forecasting was the Walworth Company. Because of the innumerable articles written and addresses made by representatives of the company, the methods followed and the results achieved are a familiar story to everyone interested in management or industrial control. The company is engaged in the production of steam fitters' and plumbers' staple supplies, such as cast and malleable iron fittings, brass valves and pipe tools, the full line comprising about 25,000 items. Every item is catalogued and carried in stock for distribution direct to the trade through seven branch houses, to jobbers through eastern and western sales divisions, and to foreign ports through an export company. The annual inventory has varied from year to year as greatly as 50 per cent and from December to January as much as 35 per cent. In setting up a forecasting system orthodox statistical technique was followed, but some of the more elaborate refinements were omitted. The "Business Cycle and Forecasting Index" as finally established consists of "a simple twelve-month average, centered, plotted against a five-year moving average, centered,"<sup>11</sup> the five-year average giving the trend line and the twelve-month average used to smooth out seasonal variations. When the cyclical movement thus discovered was expressed as deviation from secular trend, the next step was to compare it with similar movements in other curves of business activity. In the words of Joseph H. Barber, Assistant to the President: "It would be highly desirable to discover some external barometer cycle which would always predict our cycle."<sup>12</sup>

<sup>11</sup> *Administration*, May, 1923, p. 529.

<sup>12</sup> *Administration*, November, 1924, p. 479.

Although investigation showed that Walworth sales fluctuated in close agreement both with the Harvard Business Curve and Snyder's Index of the Volume of Trade, it was decided that neither could be used to forecast sales because (1) their movements did not anticipate movements in sales, and (2) since they are both composite curves, they give only the net effect of ups and downs in many different lines and may thus conceal fluctuations which have a direct bearing on the demand for the company's products. To overcome the second objection, it was decided to construct a special index representative of activity in industries, which give rise to the demand for Walworth products. The series chosen for this purpose were:

- (1) Average Volume of Trade (Snyder)
- (2) Merchant Pig Iron Orders
- (3) Structural Steel Sales
- (4) Total Building, Western States
- (5) Industrial Building, Western States
- (6) Oil Rigs and Drillings
- (7) Fire Brick Orders
- (8) Sanitary Ware Orders
- (9) Machine Tool Orders

When weighted and combined, these various series resulted in an index which fluctuates very closely with the index which shows sales of the company's products. Although it does not anticipate sales, it still is of great service in forecasting them. There is no accurate way, it is claimed, to project the curve of sales into the future simply by studying it alone; it itself tells nothing of causes, and any projection, therefore, would be a blind guess. But each of the series going into the combined index is connected either directly or indirectly with the demand for Walworth products; furthermore, for each of these series "there is some national magazine, some forecasting agency, or some special data we have gathered"<sup>13</sup> that

<sup>13</sup> *Administration*, January, 1925, p. 19.



tells what the trend will be during the coming year. On the basis of this information, each series is projected into the future and the various projections are weighted and combined into a total curve which serves as the basis for making a similar projection of sales.

The process thus far gives an estimate of total sales for the year, but does not tell how they will be distributed throughout the year. In some industries the seasonal variation of sales or orders may be the same regardless of whether it is a year of prosperity or depression, while in others it may vary greatly with the position of the year in the business cycle. The first group offers no special problem, but for the second a special method must be devised if production is to be stabilized. The method originally used by the Walworth Company is as follows: Actual sales by months are plotted, by ratio plotting, together with the five-year moving average. Then this year's curve and the projection for next year are studied in order to classify their position in the business cycle. When so classified, the curves for as many similar cycle years as can be found are placed side by side to see if there is any typical variation. Few will correspond exactly, but if in four of the five depression years, say, it is found that sales in the second quarter decreased from 10 per cent to 20 per cent, and in the third quarter rose 5 per cent to 10 per cent, there are good grounds for believing that a similar distribution will occur this year unless there is some factor in evidence which indicates that the coming year will not be a typical depression year.

Officials of the Walworth Company have given ample testimony to the success of their forecasting and budgetary methods, and the continued expansion of the company, together with its earnings record, is even more convincing

proof. The usefulness and accuracy of the estimates have been demonstrated on numerous occasions, of which we shall select three for comment. The first relates to year 1924. In spite of the fact that sales in 1922 were 42 per cent greater than in 1921, and in 1923 were 37 per cent greater than in 1922, the statistical department estimated that the 1924 figures would be  $13\frac{1}{2}$  per cent less than those for 1923.<sup>14</sup> Thus warned, the company was able to guard against over-production, and prevent losses that otherwise would have been incurred. As it turned out, sales were actually  $10\frac{1}{2}$  per cent below those of 1923. For 1925 it was estimated that sales would increase 8 per cent in volume, and would be accompanied by increase of 8 per cent in price. The volume estimate was attained within  $\frac{1}{2}$  of 1 per cent, but the price rise did not develop. The most useful estimate of all, however, was that made for the year 1926. As preliminary, it should be stated that estimates cover all phases of the business, for once the volume of production is estimated, costs can be determined within a narrow margin, then prices decided upon, from which it is easy to arrive at an estimate for profits. For 1926 the estimate was "no profits." Steps were taken immediately to avoid such an outcome, the first being the appointment of a committee on economy composed of members of each particular activity or division. After a thorough investigation, a number of policies were adopted to bring about savings, chief of which were: (1) the elimination of unnecessary reports, (2) reduction in the statistical division, (3) tightening up of inventory control, and (4) cost studies in various plants with the purpose of concentrating production of various articles in the low-cost plants. In addition, the sales force

<sup>14</sup> *Printer's Ink*, April 29, 1920, p. 144.



was augmented, with instructions to "get results."<sup>15</sup> If we may judge by financial results, these efforts were successful. The following table permits comparison of 1926 with other years:

INCOME OF THE WALWORTH COMPANY<sup>16</sup>

Year	Gross Sales	Net Profits, After Depreciation, Taxes and Interest
1926.....	6,590,842	561,908
1925.....	6,585,024	702,678
1924.....	3,673,578	362,548
1923.....	4,903,848	1,434,947
1922.....	3,323,788	505,480
1921.....	1,482,693	1,137,739

With the exception of the Eastman Kodak Company, all of the concerns we have discussed up to this point are engaged primarily in the manufacture of industrial or producers' goods. The problem of forecasting is quite different in a public utility, which sells services rather than commodities, yet the success of one such concern—the American Telephone and Telegraph Company—is so remarkable as to deserve comment. The fundamental factor in creating demand for the company's services is simply the growth and increasing density of population, and because of this, a long-run view is necessary in order that ample facilities may be provided. In addition, there is considerable fluctuation in demand simply because of changes in business activity from year to year. To meet this two-fold need, an elaborate statistical study has been made which has resulted in the construction of an "Index of General Business" covering the period from 1877 to date. Because of the dearth of material only one series—pig iron production—was

used in the earlier years; as data became more plentiful other series were added until at the present time some twelve are included, as follows:<sup>17</sup>

Pig iron production  
Unfilled orders, U. S. Steel Corporation  
Freight-car demand  
Car loadings  
Net freight ton miles  
Coal production  
Cotton consumption  
Activity of wool machinery  
Paper production  
Lumber production  
Leather production  
Power production

These series, "each of which is analyzed in more or less conventional manner to take out seasonal variation and long-time trend, with the residual fluctuation expressed in terms of standard deviation from the seasonally corrected trend,"<sup>18</sup> are then weighted and combined into a composite recording curve. Although it only records, and does not forecast business activity, this curve is of great aid in forecasting because it may be projected into the future. With it two forecasts are made, the first a very detailed budget for the year just ahead and the second, a somewhat detailed but less comprehensive forecast for the four succeeding years. The first of these was made in the summer of 1921. The following table compares for the period from the month preceding the forecast, through December of the following year, "the

	Forecast	Actual
1921-1922.....	- 10	- 11
1922-1923.....	+ 2	+ 1
1923-1924.....	+ 3	- 1
1924-1925.....	0	0
1925-1926.....	+ 3	+ 6
1926-1927.....	- 5	+ 5
1927-April to December...	+ 2	+ 1.5

<sup>17</sup> *Harvard Business Review*, January, 1923, pp. 159-60.

<sup>18</sup> *Journal of the American Statistical Association*, Proceedings, 1928, p. 117.

<sup>15</sup> *Factory*, October, 1926, pp. 594 ff.

<sup>16</sup> From *Poor's Manual* (1927), Industrial Section, p. 1204.

actual average position of the curve with the forecast."<sup>19</sup>

#### SHORT-TERM FORECASTING

In many businesses it is more important to know when changes are coming throughout the year than to be able to forecast the total business for the year. The longer in advance upturns and downturns are foreseen, the more possible it is to check production and prevent the accumulation of excessive stocks, or to speed up activities gradually to avoid a threatened shortage; in most industries any warning which is to be helpful must forecast by at least the length of time required for the manufacturing process. The search for these short-time forecasters has been much more successful than for the year forecasters mentioned. As already noted, the Simonds Saw and Steel Company has combined unfilled orders of the United States Steel Corporation and building contracts awarded into a so-called construction index which is said to anticipate sales by two to four months and thus serves as an agency for controlling production. In some industries which manufacture largely for order it has been found that an index of the orders received for the company's own goods qualify as a reliable forecaster not only for sales but for future orders as well. This is true in particular of the Graybar Company, subsidiary of the Western Electric Company, and manufacturer of electrical supplies. In writing of the experiences of this company, Edmond E. Lincoln says:<sup>20</sup>

In general, when our "orders" curve has advanced rapidly for about three months from a position near "normal," a quickly approaching peak in orders is

indicated, which will ordinarily be followed within three months or less by a peak in sales and within a short time by a downturn in general business activity.

Another experience of the same kind is reported by a group of eleven manufacturers in the Boston area who, in conjunction with Harvard University, get together to study management problems. As a result of this study an index based on current orders received by members of the association has been evolved which follows the Harvard Business Curve rather closely, but anticipates it by one to six weeks, and also gives warning of conditions to be expected in the business. This index has been of great value, it is claimed, for conditions in the industry are such that two weeks is decidedly valuable in deciding whether to produce for stock, or in determining to buy raw materials at prevailing prices.<sup>21</sup>

The Eastman Kodak Company is another that has attempted to find a barometer for sales of the principal products. A number of series was studied to discover the degree of correlation between the series and company sales, the most important being (1), Bank Clearings (outside of New York), (2) Price Indexes, (3) Employment Index, (4) Harvard "B" Curve. As a result, a well-defined correlation was found between company sales and the Harvard "B" Curve, and between sales and the employment index. The employment index was found to turn up well in advance of company sales; in the words of an official—"the length of the lag has varied, but the average lag for the past twenty years gives us a good yardstick to use in predicting when the upturn in our sales will occur. The last upturn came within one month of the month that it was predicted by

<sup>19</sup> *Journal of the American Statistical Association*, *Proceedings*, 1928, p. 117.

<sup>20</sup> *Harvard Business Review*, October, 1926, p. 44.

<sup>21</sup> *Factory and Industrial Management*, May, 1928, pp. 978-979.

the use of this average lag. A well-defined lag in the downward turns was also found."<sup>22</sup>

Since these short-run forecasts are subject to frequent alteration, it is difficult to check up on their accuracy. Officials of the company, especially those in the statistical department, very naturally desire to make as good a showing as possible. Since all the records are in their possession, we must accept the claims as made without attempting to go behind them. Usually these are not couched in very definite terms, officials of many concerns being content to state the forecasts were successful in preventing accumulation of excessive inventory, or in avoiding being caught with a heavy burden of unfilled orders. Representatives of the Edison industries, however, have offered definite figures, asserting that in 1925 monthly estimates of surplus made thirty days in advance, were on the average 98 per cent correct.<sup>23</sup> Again it has been said that "the forecast of November 30, 1921, made 30 days in advance, was so near the actual figures that for all practical purposes it would have been unnecessary to have substituted the actual final figures when they were ascertained."<sup>24</sup> It is certain, however, that this should be interpreted as an exceptional rather than a typical case.

#### CONCLUSION

This survey makes no pretense of including all the concerns that are following more or less statistical methods of

forecasting, since the purpose was simply to indicate the possibilities of the movement by citing what has been and is being accomplished by some of the outstanding firms. A complete survey would undoubtedly disclose a host of companies, some large, some small, some using a highly developed statistical technique, others depending on rougher approximations, with a wide range in the degree of success being achieved. In measuring the accuracy of the forecasts, we must remember that the figures are those presented by company officials, and, while we do not mean to question their honesty, we must remember also that they are interested in making as good a showing as the figures warrant. To offset this tendency toward an appearance of greater accuracy than really exists, there is often another influence working in the opposite direction. One of the uses made of the forecast is the setting of quotas for the sales force. Because of psychological effect, some concerns deliberately make a forecast in excess of what they think will be sold, and when actual sales are set against such an expanded forecast, the margin of error appears exceptionally large; the advantages of a more accurate estimate may have been achieved, however, since those in control of production and finances have really been working on the basis of the more moderate forecast.

To the extent that the movement is successful, it offers an unusual means of ironing out price fluctuations. With regard to manufactured goods, supply is subject to a high degree of control. If, therefore, we can discover the influences which give rise to changes in demand, and if we can tell how these influences are going to vary in the future, supply can be adjusted so that little or no price change need occur. The most harmful fluctuations are those which come suddenly, and the very

<sup>22</sup> *Harvard Business Review*, January, 1924, p. 187. In a letter dated May 12, 1928, Leonard Stapleton, Statistician of Eastman Kodak Company, says: "The labor employment index is now not so helpful as it was years ago, although I believe it is very significantly related to retail trade in general."

<sup>23</sup> *Management and Administration*, June, 1925, p. 528.

<sup>24</sup> *Administration*, October, 1922, p. 412.

suddenness is due to lack of knowledge. When business is bad, the ordinary business man expects it to continue bad indefinitely; when orders are increasing, he can see no reason why they should ever decrease. As long as he operates on such a basis, production must proceed by fits and starts. Periods of idleness are suddenly followed by sessions of great activity, generated by a flow of unanticipated orders, and usually accompanied by rapidly rising prices. With little knowledge of the perma-

nency of these orders, production overshoots the mark and price-cutting and part-time operation are once more the order of the day. Accurate forecasting, on the other hand, acts as an antidote to this "hypnotism of the status quo" by warning the producer what to expect. If accurate, it tends to retard price movements on the upswing by having goods ready for delivery when demand develops, and on the downswing, by having inventories at a minimum when demand falls off.

## Shall We Control Demand or Follow It?

By CHARLES P. WHITE, Ph.D.

University of Pennsylvania

**T**HERE are two main problems in connection with demand that each producer must face: First, what will be the total demand; second, what style will be demanded. In reality, these are two aspects or phases of the same problem, rather than two separate problems; total demand is seldom a fixed quantity, since it tends to vary with changes in style, therefore both questions must usually be answered simultaneously.

In its original sense, style was thought of as applying only to clothing and articles of personal adornment, especially those used by the wealthier class. As such, it affected only a small proportion of producers, the more speculatively inclined who were willing to undergo great risk in the hope of gaining a large profit. In the present age, however, the term has taken on a wider meaning. In one direction this means that style has filtered down from the upper to the lower classes, and is no longer the exclusive prerogative of the wealthy; the shop girl and the clerk are just as insistent on having the latest creations as are those of the upper four hundred. In another it means that style has been injected into many lines with which it was formerly unconnected. There are now modes or fashions in houses, in furniture, draperies, bathroom furnishings, automobiles, silverware, in fact, in practically everything except foods, industrial equipment, machinery and tools. For every producer or merchant who was interested in style in former times, there are now probably a dozen, and the interest is a vital one, for a slight

error in determining what style will be demanded is the difference between profit and loss.

### CAUSES OF THE GREATER EMPHASIS ON STYLE

One of the main reasons for the increased emphasis on style is that wealth is not only greater in volume but more widely diffused than ever before. In a primitive society practically all effort is devoted to providing the essentials of life, and the tools required to produce them, with either little energy or time left for the creation of luxuries. There is always a leisured group requiring such goods, but their number is usually small and the demand is insufficient to divert any considerable amount of labor and capital to its satisfaction. With greater industrialization the leisure class is expanded, wealth is increased and more widely diffused, and demand broadened to include a larger and larger proportion of comforts and luxuries. Although no one has succeeded in making a satisfactory distinction between necessities, comforts and luxuries, something can be gained by noting the nature of the need satisfied, and the motives on which consumption is based. As long as foods are required primarily to satisfy hunger, clothes to protect the body and houses to provide shelter, the particular type is relatively unimportant so long as it fulfills its primary purpose. But as soon as this fundamental desire is satisfied, attention is diverted from purely utilitarian ideas to those of beauty, adornment, and most of all, distinction. The demand is no longer



for just hats or shoes, but hats and shoes of a particular style; not simply for a given number of motor cars, but motor cars of a definite type, with variations as to body lines, open or closed models, etc. Wealth, in other words, elevates consumption from the level of necessities to comforts, and substitutes beauty and distinction for the mere satisfaction of physical wants.

Another influence is the concentration of population both as to space and time. We are more and more becoming an urban people, crowded together in large centers where daily contact between thousands and hundreds of thousands makes for almost instantaneous dissemination of ideas. Concentration with regard to time is even more profound, due to improvement in the means of transportation and communication. Railroads, aeroplanes, automobiles, good roads, cheap gasoline, newspapers, magazines, national advertising, movies, radio, have all combined to make the nation a single unit through which new ideas, fads, and fashions are transmitted as soon as they are born.

Other influences tending in the same direction are the greater homogeneity of the people resulting from the gradual disappearance of the frontier, and the greater uniformity and standardization of the educational system.

These influences have affected style in a variety of ways, and have greatly complicated the problem of the producer and merchant. Greater wealth has led to more insistence on style. Concentration has made for more rapid spread of style, and the almost simultaneous adoption in various parts of the country gives the producer little chance to prepare, for no sooner does a style begin to get under way, than he is overwhelmed with an avalanche of orders. But a more important effect has to do with the length of time a given style prevails. With many people the

essence of style is exclusiveness; its chief merit, the mark of distinction and leadership it confers. But with the rapid spread to all sections of the country and to all layers of people, this feature disappears. The very forces which speeded up its adoption have also reduced the normal life of the mode or fashion, and made its ending more abrupt, thus throwing on the producer another task—that of foreseeing the end of the style cycle.

#### FACTORS TENDING TOWARD GREATER CONTROL

Fortunately, there are some indications that the situation may be brought under at least partial control. It was stated above that improved means of transportation and communication have greatly increased the rapidity of style changes and widened the area in which they prevail. To this there is an opposite angle, for by the same means, the producer is able to keep in closer touch with the developments, and while this may not completely offset the first influence, it tends at least to neutralize it.

A more important possibility seems to lie in the increasing knowledge of psychology. While it is true that some principles have been developed to explain why an article is in demand at a certain time, most of the influences are still hidden in the uncharted fields of psychology. It is known, for example, that there is a definite style cycle in many goods. Men grow weary of the old and accept the new with enthusiasm; the new in turn becomes old, to be replaced by something else, and after a sufficient number of changes, the style which was once rejected is again accepted and becomes the vogue. It is also known that each style craze follows a definite course of development—a period of introduction by the more progressive spirits—the innovators or

leaders—followed by a more or less lengthy period of imitation, during which the craze “catches on” and becomes popularized, then a period of widespread acceptance and exploitation, followed by the decline, which is often abrupt. But two questions of tremendous importance to the producer remain unanswered: What determines which one of the innumerable styles that are being introduced will “catch on”; and second, once the craze is an established fact, how is it possible to know how long it will continue?

Three lines of attack are open in answering these questions. The first is through research in the laboratories of academic institutions; the second, research work carried on by the style bureaus and departments of individual firms; and third, a similar type of investigation conducted by coöperative research bureaus. Because of the greater resources available, the mass of sales data and records in the files of the coöperating companies, and the opportunity for benefiting by the practical experiences of those in touch with market conditions, the greatest hope of success seems to lie in the third approach.

The object of this research, presumably, is to discover the principles governing the formation and development of styles in order that producers may either passively anticipate style changes and estimate its probable period of life, or take an active part in guiding style choices along desired lines. But if such knowledge becomes the common property of all producers, are we not forced back to our original starting point? Ability to forecast style trends might quite conceivably work to the advantage of all producers, by permitting them to govern production in accordance with consumption, and thus reduce price fluctuations, but attempts on the part of a number of producers to guide public taste toward a particular fashion

are bound to end in success for some and failure for others. Increased knowledge of style principles may therefore tend simply to strengthen competitors, and render the results of competition more disastrous just as the effects of war are made more disastrous when both belligerents are armed with modern instruments of warfare.

Such a possibility might be avoided in part if some individuals or group of individuals should establish themselves as dictators of style in the various lines. Such a position, however, could be held only by continued proof of supremacy against pretenders to the throne, and unless the dictatorship were admitted by all, the loss and waste of competition and the sudden changes in price would be much the same as they are today. A more feasible plan and one that seems more probable in the light of modern developments is coöperative guidance of style. This would mean that competing manufacturers would come together through trade associations, establish style bureaus or departments for study of fashions, and trend in public taste, and on the basis of their findings, decide that certain fashions only should be developed. This would mean that each manufacturer could still establish his supremacy through better service, better workmanship, or higher quality, but it would also mean that he would give up the chance of making high profits by successfully launching his own designs or patterns which were out of line with those of the group. Because of this, it is probable that the plan would never work so long as the profit motive is as predominant as it seems to be now.

#### CLASSIFICATION OF METHODS USED IN SOLVING THE STYLE PROBLEM

The attempts to deal with the style problem may be classified roughly in three groups. In the first are those

made by merchants and manufacturers who have decided that the influences which lead to the adoption and popularity of certain styles are so shrouded in mystery that nothing can be done about it. They say, in effect, that the final selection of any one, as the mode, is largely a matter of chance, that the proper way of avoiding loss is to wait patiently until some fashion is established, then put forth every effort to supply it. In the second group are those who have gone to the other extreme and assert that since style is based on human choice, it can be controlled to the same extent that any choice can be; what is needed, therefore, is imagination, initiative and resourcefulness in creation, followed by ingenuity in presentation. Midway between these are those who admit that anticipation of demand is dangerous, but that waiting is fatal, and who, therefore, attempt to anticipate style changes as much as possible, but realizing that this cannot always be done successfully, strive to keep in close touch with public whims and maintain a flexible organization which will permit ready changes.

Those who are able to follow the first plan completely are few in number. By the adoption of such a course a merchant or manufacturer confesses either his inability or unwillingness to play the style game, and is finally forced to leave the field entirely, or to concentrate on the production and sale of the more staple articles. As long as he remains he constitutes a real menace to stability both of industry and prices. The merchant who follows such a policy is the one who sends in the last-minute orders to wholesaler or manufacturer only after the style craze has been established and is made evident to him by inquiries from customers. Failure to receive goods immediately leads to duplicate and triplicate orders that mislead manufacturers as to

the real demand and result in rapidly rising prices. With the manufacturer the situation is much the same. Unable to forecast what styles will be or unwilling to trust his judgment, he stands ready at all times to rush in and overwhelm the market, once a particular vogue gets under way, and thus adds another uncertainty to a situation already unstable.

Those who follow the opposite policy attempt not only to anticipate demand, but to guide it in the channels where they want it to go. It is absurd, of course, to believe that anything can be foisted on the public simply by clever advertising and high pressure salesmanship, as many so-called style dictators have discovered to their sorrow in recent years, two outstanding examples being in connection with bobbed hair and short skirts, when public fancy went in just the opposite direction from what was "decreed." Such examples do not prove that tastes cannot be influenced by conscious action, but they do indicate that the guidance must be in the direction of rather fundamental trends. Leaders in style creation have often pointed out that no vogue, no matter how suddenly it seems to spring up, is entirely unrelated to the vogues or fashions which have just preceded it. Once it gets under way, it is easy to look back and see that conditions were "ripe" for such a development; the task of the style leader, therefore, is to study past experiences so that he will be able to recognize the symptoms and know in what direction public taste is ready to turn. The time and effort now given to this type of work is tremendous, and promise much for the future.

#### THE PROPOSED "THREE-PHASE SYSTEM"

One very interesting suggestion which attempts to secure the advan-

tages of these various methods is the so-called "Three-Phase System" proposed by Henry Creange, Art Director of Cheney Brothers, manufacturers of silk. This plan recognizes that the bulk of modern business gains are derived from standardization and quantity production, and at the same time, that there is a great opportunity for profit in successful launching of new styles. In order that both types of gain may be secured, it is proposed that the total product be split into three parts; one consisting of "developed versions of the preceding year's successful creations," another the "developed versions of the successful things launched in kindred industries," and the third, novelties, or new creations which are being tested out or launched. There is no necessity for the three phases being of equal volume; in fact, it is intended that the third constitute a relatively small share of the total product. Neither is there any particular merit in separating the first two types of products; in either case they are goods which may be considered as staples, or if not that, at least fashions which are still in strong demand. Such products, it is expected, would be sufficient to keep the mills busy and earn enough to finance the "creative" effort; the whole plan, it is claimed, would eliminate waste, and "secure comparative safety in large production for art industries, without sacrificing . . . leadership in creative ideas . . ."<sup>1</sup>

With reference to the former classification, the idea in the first two phases is to follow demand, and in the third, to guide or control it.

#### THE "SERVICE STOCK" IDEA

The outstanding examples of firms that follow the middle policy, anticipating style changes as far as possible, but at the same time keeping in close

touch with demand and maintaining a flexible organization which can be adapted readily to new conditions, are found in the shoe and textile industries. The first requirement of such a plan is the creation of a service stock which can be drawn on at a moment's notice to fill orders from wholesalers or retailers. Obviously not all styles can be carried in stock, therefore, the first step is to analyze sales records and discover those styles that seem to be in constant demand. Once this is determined, the goods can be manufactured and placed in stock in sufficient quantities to meet the day-by-day demand. In order that the situation may be kept well in hand, it is necessary to maintain close touch with public taste, which may be done either by securing frequent reports from retailers covering both inquiries and orders, or by sending special representatives into the main markets to study market trends. As soon as orders for a particular style show a tendency to decrease, additions to the stock of that commodity are checked, and if demand continues to fall, it will be removed from stock entirely, and made only on special orders.

#### IN THE SHOE INDUSTRY

The outstanding example of this practice in the shoe industry is the A. E. Nettleton Company. Some fourteen years ago this company began to build up an In-Stock Department so that dealers could order at any time and get prompt shipments without waiting. At first only the more popular styles were stocked, but the plan proved such a success that now forty styles, in full size range, are carried, which includes everything needed by a modern-up-to-date store. Even now, however, only the standard styles are stocked, the stock being kept up to the desired figures by ordering from the

<sup>1</sup> *Textile World*, September 4, 1926, p. 1299.



production department each week in accordance with orders received from dealers. It is claimed that 50 per cent of total sales are now made from this department, and that the plan, in conjunction with advertising, has so stabilized the business that there are no longer peaks and valleys on the sales chart, and has enabled production to run on a fairly constant level three hundred days a year.<sup>2</sup>

A somewhat similar practice is followed by the Ipswich Mills, which manufacture hosiery for men, women and children. Before the war the style problem was of little importance to the mill, since the styles were practically set by the big customers, who looked over the samples and placed orders in advance; since the war, however, the burden has been shifted to the mills. The first step in meeting the situation was the establishment of a style department to study requirements of consumers at prices they desire to pay, and to discover market trends. Next, a service stock, similar to that maintained by the Nettleton Company, was created containing the proper proportion of all colors, styles and sizes of hosiery in demand, from which shipment could be made as soon as goods are packed. To see that the proper styles and colors are kept in stock, an analysis of sales is made each week and information sent to executives on Monday for use by them in controlling the week's production. In recent years color has been a more important factor than style in the hosiery trade, and has given producers the greatest concern. Although they realize that one producer can do little to influence color selection directly, officials of Ipswich Mills believe that much can be done by limiting the number of shades produced. In accordance with this belief, certain master colors, designated as tones, are chosen

and all shades of that tone grouped together. In a recent year, for example, the gray tone group included only four shades (known as gunmetal, zinc, dove gray and moonlight) as contrasted with twelve in former years. It is claimed that the grouping method not only facilitates color selection by the consumer, but also reduces the waste and risk incidental to production of a large variety of colors. Additional attempts to standardize shades and encourage any prevailing tendency are made by publishing in trade journals the results of the weekly color analysis, and by mailing reports twice a month to hundreds of buyers.

An even more interesting experience is that of the Gotham Silk Hosiery Company. This company has shown a remarkable development, sales increasing 100 per cent from 1913 to 1922, and 541 per cent from 1922 to 1927, with deliveries often running six months behind orders. Because of numerous unsatisfactory features connected with this type of production, the company decided to take no advance orders but to manufacture only for stock. Accordingly, a service stock made up of goods in greatest demand was established from which orders could be filled immediately; the boast is now made that any order received between the hours of 9 A.M. and 4 P.M. is filled and the goods in transit before the day's work is ended. In order to have the proper type of goods on hand for such prompt delivery, daily reports are received from eighty to one hundred large stores located in large centers throughout the country. These reports show in detail the sales for the day, giving style, size and color, and on this basis, the company is prepared to change overnight from the production of one style to another. Although their main purpose is to warn of sudden changes in demand, these reports are

<sup>2</sup> *Printers Ink*, August 12, 1926, p. 16.



also useful in making up the total manufacturing program of the year and in distributing production by months. The success achieved in the estimates is shown in the following table, which may be compared with results cited in the previous chapter, which dealt primarily with industrial goods. These estimates were made one year in advance.<sup>3</sup>

Year	Estimated Shipments (Dozen)	Actual Shipments (Dozen)	Per Cent of Error
1924.....	446,000	439,611	1.4
1925.....	559,000	560,817	0.3
1926.....	781,000	774,000	0.9

#### FOLLOWING DEMAND IN THE AUTO INDUSTRY

Although the examples presented are derived from the shoe and hosiery industries, there is no reason why similar continuous control over production in accordance with changes in demand cannot be carried out in other lines. Few, perhaps, would think that the demand for automobiles is subject to much variation, or that the style factor is important, yet here we find methods of control almost as detailed as those already described. Because of the attention given to study of sales records and the attempt to estimate production and establish sales quotas, the experiences in the auto industry might very well have been recited in the chapter on Forecasting, but since most of the effort has been concerned with determining changes in demand as they occur, they will be recorded here.

The degree of control that now exists may be traced to conditions that developed during the latter part of 1922

<sup>3</sup> *Printers' Ink*, December 22, 1927, p. 36. Per cent of error computed by the writer.

and the first of 1923, when manufacturers "overshot their mark with a production wholly unjustifiable by either present or future demands."<sup>4</sup> Within a few months, production dropped to a point below what it had been three years previously, stocks slumped, and future orders almost disappeared. From this experience one important lesson was learned—"that dealer organizations must be perfected and that production must be correlated to dealer demands."<sup>5</sup> To prevent the recurrence of such a disaster, most manufacturers set up statistical departments and sales estimates divisions not only to estimate total production for the year, but to allocate it by districts. In addition a closer touch with the market situation is secured by a system of reports from both wholesaler and retailer. On the first and fifteenth of each month the retailer reports to the branch or wholesaler showing, for each model, the number of cars on hand, the number of unfilled orders, the number of cars in transit to him, the number delivered in the last two weeks to him, and number he has delivered to his customers. Each day the branch or wholesaler reports the number of cars of each model on hand, shipments made that day, and any other data necessary to show which models are most in demand. Under such a system, the company is able to speed up, check, or suspend production entirely of any model as reports seem to indicate is necessary.

#### GUIDANCE OF DEMAND BY REDUCTION OF STYLES

There is no question but what a large part of the ills arising from style change are directly traceable to the producers themselves, and the policies they fol-

<sup>4</sup> John N. Willys, President, Willys-Knight, in *Manufacturing Industries*, March, 1926, p. 166.

<sup>5</sup> *Ibid.*, p. 166.

low. One common practice is the establishment of definite seasons during which goods of a certain type only are to be used. Accordingly, shoe manufacturers convene, and solemnly decide that there shall be five seasons in footwear, outlining with care not only the limits of each season, but also the type of shoes that are acceptable in each period. In the same way, clothiers have largely succeeded in destroying the old fashioned idea that one overcoat is sufficient for man's happiness, by encouraging the use of the lightweight "top coat," and not content with this, are now on the way to establishing a different type for fall and spring wear.

The plan, however, is not restricted to the clothing industry, for producers have been quick to make use of it in other lines, and for other purposes. When business is poor, and standard goods are moving slowly, why not stimulate sales by bringing out a novelty? The well-known Duofold pen, to mention only one, owes its origin to such a reason, and similar examples can be found in every field. But unless followed carefully, such a practice leads to its own destruction. As models and styles are multiplied, selection by the consumer becomes more difficult, demand follows less definite trends and is harder to forecast. On the production side, costs are greatly increased by producing limited quantities of many styles, material costs mount because purchasing in bulk is no longer possible, and inventories rise because it is necessary to keep on hand a full line of goods in each model that is in little demand.

To get away from this difficulty, many concerns are going in for simplification or standardization of goods, and are reducing styles to a minimum. The need for such a movement can be appreciated only by noting the almost unbelievable extent to which diversifi-

cation has gone. A considerable range of choice should be permitted for personal articles, but it is doubtful if the most extreme individualization requires that there be 5500 types of rubber footwear, 3000 varieties of pocket knives, or even 2000 brands of face powder. The practice has affected even such prosaic articles as washing machines, of which there are said to be 100 varieties, and milk cans, of which there are 200 varieties. In the plow business, diversification grew until each of the leading producers was making over 1000 models, while one stove manufacturer has admitted that his company turned out at one time 339 styles and sizes of stoves and ranges.<sup>6</sup>

One interesting example of what can be done by reducing the number of styles is given by Prof. M. T. Copeland, in his "Problems in Marketing." The company cited was engaged in the manufacture of silverware, turning out a complete line of knives, forks and spoons. At one time three general grades of plate were sold, with as many as ten patterns in each grade. During the war the Conservation Division of the War Industries Board succeeded in reducing the patterns to a maximum of five in each grade, which brought such satisfactory results that the company decided to go even further in this direction. Analysis of sales records showed that a pattern ordinarily maintained a satisfactory volume of sales for about ten years. It was decided, therefore, to keep the number of patterns low and push each one vigorously until annual sales volume falls to 30 per cent of what it has been in the peak years. At this point aggressive sales efforts are to stop, but production continued for one year, at the end of which retailers will

<sup>6</sup> A. L. Blakeslee, Vice-President, Kalamazoo Stove Co., in the *Magazine of Business*, September, 1927, p. 280.

be notified that the pattern has been discontinued, and allowed to turn in their old stock, provided they place an order for the new pattern at least equivalent to three times the amount of goods turned in. No results of this policy are given, except that the company was able to withstand the request of retailers for new patterns to stimulate sales during a depression.

Somewhat similar plans have been put in effect by the Kalamazoo Stove Company mentioned above. The number of styles have been reduced from the 339 that were formerly made to a point where the main volume of business is done in ten styles. It is claimed that in 1926 production was increased 20 per cent over the 1925 figures without increasing the number of employees, that the consumer is getting a better stove than ever at a lower cost to him, and that, with the exception of 1921, the company has an annual increase in volume and profits for the past six years. The main advantages coming from the reduction in styles are stated as follows:

- (1) A reduced investment in materials and finished products, together with buying advantages that come because of simplified material needs.
- (2) Reduction in production costs. Men formerly were continually changing from one operation to another, which decreased both the degree of specialization, and output. Now there is faster and better work, as indicated by the fact the time required to manufacture a stove is now three days contrasted with a former figure of twelve. Greater skill has resulted in higher wages which in turn has meant less labor turnover.
- (3) It is possible to charge a lower price for the product.

#### OTHER METHODS OF GUIDING DEMAND

In contrast with guidance of demand by restricting the number of styles from which choice may be made are the more usual methods of advertising, press agent methods, "decoy" style announcers, etc. Methods used in advertising are so well known that little comment is necessary. To be successful it must be based on sound psychology, and as far as style formation is concerned, the soundest principle is to impress on the public that this is the correct thing, and the more subtly the impression is made the better. As an example, not of subtlety, but of the type of impression that it is desired to make, we may note the slogan used in the coöperatively financed campaign to retrieve the markets lost by linen damask ware during the war, which was, "Linen Damask impressively correct." Press agent methods include a variety of schemes for bringing a particular commodity to the attention of the public, who would not be reached by customary advertising methods. One rather harmless device of this kind is to induce artists engaged in making drawings for other "ads," to include the particular style or product in his drawing, as one glove manufacturer succeeded in having a particular style of glove included as a part of the background of a picture designed to advertise some totally unrelated product. Another device formerly tried was "crashing" the news columns with mention of the commodity. Whether or not this is an example, it is interesting to note that the *New York Times* printed a lengthy interview granted by a prominent lexicographer on the place of linen damask in history, and strangely enough, this took place at the same time the linen damask campaign was under way.

"Decoy" style\* announcers have

AND been used to advantage on many occasions. In its simplest form this consists of inducing some one of prominence to adopt the style in the hope that others will follow the example. It has been claimed that "knickers" were introduced among college girls by an enterprising sales agent who made use of this scheme. Also, it has been said that glove manufacturers of France at one time delayed the trend away from elbow-length gloves by inducing prominent theatrical ladies to appear at the races wearing gloves of the style which they desired to continue.

To the extent that these methods are used by a number of producers working

in unison, they may tend to bring greater stability in style, and reduce fluctuations in price. But in most cases, they represent a combat between rivals, each striving to force the adoption of his particular style, and when used in this way, they lead to greater style changes, and more interference with price. In the absence of co-operative action, or the establishment of acknowledged style dictators, the most promising policy seems to be that of "following" demand, by keeping in close touch with market sentiment, building up "service stocks," and maintaining a flexible productive organization.

# Hand-to-Mouth Buying

By CHARLES P. WHITE, PH.D.

University of Pennsylvania

THE years immediately following the deflation of 1920 were characterized, among other things, by a policy of buying for immediate needs only, in contrast with forward buying, or the policy of placing orders for goods several months in advance of the time when they were actually needed. This practice has been hailed, on the one hand, as an innovation in merchandising which will stabilize production at a steady rate and wipe out many of the troughs and peaks of business. Some say that it is an absolutely new thing, a discovery, which will revolutionize the ways of doing business; others, that it has existed in varying degrees at several other periods of our history and now is but the outgrowth of our gradual transition from an agricultural to an industrial-commercial nation. To some it appears as quite temporary, a characteristic of the post-boom period, when excess manufacturing capacity and gradually declining prices prevail; to others it offers every promise of becoming permanent because it is based on reasoning which is essentially sound.

## THE LONG-RUN CAUSES

Facts in support or refutation of these contradictory views are lacking. If we accept the definition of H. N. McGill, that hand-to-mouth buying is "the purchase of stocks of merchandise by the retailer, or the purchase of raw and semi-finished materials by the manufacturer in limited quantities, so as to encourage more rapid turnover and reduce inventories,"<sup>1</sup> we must agree that to some extent, at least, it

depends on long-time or secular influences. Some decades ago it was the practice for country merchants to buy but once a year, making a special trip to the city and laying in a stock for twelve months. Later wholesalers became more aggressive and sent out salesmen, who took orders twice a year for goods to be delivered in four to six months. Both the early policy and its later modifications were made necessary by two factors: first, the practice of the manufacturer in making goods only in response to rather definite orders, and second, the time required for transportation. With the extension of the railroad net to cover even the outlying sections, and with the improvement of railroad facilities, there came a remarkable reduction in the time required for shipment. The extent of this reduction is shown by comparing the length of time required to get a shipment of goods from the Atlantic seaboard to Kansas City, at various periods, as follows:<sup>2</sup>

Fifty years ago:	six weeks to two months.
Twenty years ago:	one month.
Now:	ten days.

Coincident with this improvement in transportation there has been a similar change in communication facilities. The development of the telegraph, the telephone and the radio, the widespread use of newspapers with their syndicated news articles and features, magazines loaded with pages of nationally advertised products, and the movies, with the daily news reels, all have tended to reduce the nation to one compact unit, swayed by common impulses. No

<sup>1</sup> *Industrial Management*, June, 1927, p. 344.

<sup>2</sup> *Ibid.*



longer are style changes gradually transmitted westward in successive wave-like fashion; style crazes in New York or Boston appear almost simultaneously in Oshkosh or Portland, Oregon; cross-word puzzles, and "ask me another" prosper and perish at almost the same time in the industrial East and the more rural sections of the mid-West. The effect of these developments upon the merchant's buying policy has been two-fold: first, it has tended to place a much greater emphasis on style or vogue; and second, it has greatly increased the rapidity of style changes. For both reasons, large stocks of goods become a distinct liability and a possible source of considerable loss; the merchant has every reason for buying often, and in small quantities, and improved transportation facilities make it possible for him to follow such a desirable policy.

In addition to these general economic and social changes, which have given increasing impetus to hand-to-mouth buying, there are others which prevail with equal force at any time. Outstanding among these is the item of cost incurred for warehousing goods until they are sold, for insurance, or for interest on funds borrowed to carry excessive inventory. Large department store owners usually receive credit for being the first to realize the huge savings that could be secured through a policy of small inventory and rapid turnover. The lower margin of profit required on each unit, with the greater turnover, made lower prices possible, and was an important influence in forcing smaller competitors to adopt the same policy.

#### IMMEDIATE CAUSES—POST-INFLATION INFLUENCES

In spite of the general influences tending toward a change in buying practices, there is no question that the

real stimulus came from conditions which immediately followed the deflation of 1920. The period of rising prices which existed during the war and culminated in the post-war boom of 1919 and 1920 was characterized by extensive speculation. Belief that prices would rise still higher caused merchants to place orders for more goods than they had immediate prospects of selling; fear that the manufacturer would be unable to make deliveries of the promised quantities, at the time agreed upon, led to the placing of duplicate orders with competing manufacturers. This pyramiding of orders falsified actual demand, creating the impression that it was much larger than it actually was. Manufacturers were misled as to the true conditions, and engaged in vigorous bidding for workers and raw materials in anticipation of the huge sales they expected to make. Prices were forced still higher and merchants continued to pyramid orders. Finally the feverish efforts of the manufacturers materialized in the form of goods, and the merchant, convinced that he could now secure deliveries in the quantities desired, began to cancel his orders. The market was glutted; the over-supply could be moved only by extensive reduction in price, and industry was forced to mark time until the excess goods were used up.

As a result of these experiences, a period of extreme conservatism set in. The severe losses sustained on excessive inventories, and uncertainty as to future price movements, made many merchants unwilling to commit themselves, except as their stock was actually depleted. Once begun, the new policy rapidly grew in favor because of the manifest advantages referred to above—less capital tied up in inventory, more rapid turnover, permitting a lower unit price, and lessened chance

for loss, due either to decline in the price level, or to a change in the style of the particular goods.

#### THE TRANSPORTATION SITUATION

These influences are likely to prevail after any inflation period and encourage a changed buying policy. In addition, the recent period was characterized by extreme improvements in transportation, which made it possible to put the new ideas in practice. One of the main reasons for the duplication of orders, referred to above, was the fear that prompt deliveries would not be made. Following the strain of meeting the tremendous war-time demands, the railroads found themselves in a very much run-down condition, with the number of bad-order cars and locomotives mounting rapidly, while the number of surplus cars decreased. During the years immediately following the return of the roads to private owners, tremendous sums were spent to replace worn-out equipment and to expand existing facilities. The success of these efforts is shown in the following tables:

tions of increased efficiency and ability to handle more traffic are shown in the percentage of bad order cars and the capacity of cars available.<sup>4</sup>

Year	Per Cent Bad Order Cars Are of Total Cars in Use	Capacity of Cars in Hands of Railroads, in Millions of Pounds
1918. ....	5.9	.....
1919. ....	7.0	.....
1920. ....	7.3	.....
1921. ....	13.9	.....
1922. ....	13.3	.....
1923. ....	8.0	.....
1924. ....	8.2	204,316
1925. ....	7.9	209,935
1926. ....	6.7	211,257
1927. ....	6.1	211,784

During the same period there was considerable development in transportation by motor truck, registration increasing by 147 per cent between 1921 and 1926, and 71 per cent between 1923 and 1926.<sup>5</sup> Falling prices, and the fear of further declines, together with the huge losses on overvalued inventories, furnished the main

FREIGHT CAR MOVEMENT<sup>3</sup>

	Surplus—Total Cars	Shortage—Total Cars	Car Loadings
1920 .....	24,194	82,056	3,759,873
1921 .....	339,026	1,896	3,276,930
1922 .....	164,500	51,579	3,600,630
1923 .....	69,659	27,873	4,151,101
1924 .....	229,908	1,046	4,044,536
1925 .....	241,289	440	4,268,679
1926 .....	205,915	334	4,424,902
1927 .....	265,159	142	4,309,525

<sup>3</sup> From the *Survey of Current Business*.

The significance of the change may be emphasized by noting that while car-loadings in 1926 were 17 per cent in excess of those of 1920, there was a net surplus of freight cars amounting to 205,581, compared with a net shortage of 57,862 in 1920. Other indica-

incentives for a changed buying policy; improvements in transportation facilities made it possible to put such a policy into effect.

<sup>4</sup> From the *Survey of Current Business*.

<sup>5</sup> From *Facts and Figures of the Automobile Industry*.

Our concern, however, is not the causes of hand-to-mouth buying, but with its effects. How does the practice affect business? Does it steady production, and make it more uniform, or does it tend to increase the ups and downs? Are prices stabilized, or are their fluctuations made more violent?

#### ALLEGED ADVANTAGES OF HAND-TO-MOUTH BUYING

Those who approve of hand-to-mouth buying have made extravagant claims as to the advantages it brings among which are the following:

- (1) Whereas forward buying accentuated seasonal activity with corresponding slumps, hand-to-mouth buying spreads production more evenly throughout the year.
- (2) It tends to bring production more nearly in line with consumption. The producer knows more definitely what the actual demand is, and the chance of over-production is reduced.
- (3) The elimination of over-production means steadier, more uniform employment.
- (4) Steadier production means steadier profits for the stockholder.
- (5) It means that lower inventories are required, and thus tends to minimize the loss resulting from rapid style changes, a loss, which with large stocks on hand, would be excessive.
- (6) Lower inventories make possible a more rapid rate of turnover.
- (7) Higher rates of turnover tend to reduce the margin of profit required on each unit sold, and to make lower prices possible.
- (8) Reduction in inventories reduces the demand for capital and releases capital for other uses.
- (9) The efforts of the manufacturer to cope with the problem by producing for stock will tend to standardize products, and reduce the style factor, since the standardized product can be supplied from stock without delay, and at much lower prices.
- (10) It tends to throw on the producer more of the cost of over-production; this in turn tends to clarify the true cost of manufacture, as distinct from distribution.

#### THE EXTENT OF THE PRACTICE

In order to pass on the merit of these claims we should know the extent to which the practice has been carried. This in turn requires that we know (1) just how average orders now compare in size with average orders in previous years, and (2) how far in advance of expected delivery orders are placed now as compared with previous years. In practically no discussions of the subject are such facts offered. Manufacturers insist that retailers are ordering more frequently and in smaller quantity; producers of raw materials say that the manufacturers delay as long as possible in ordering supplies, but neither can give figures to make accurate comparison possible. Some attempt has been made along this line in the wholesale grocery trade, which shows that for one group of wholesalers the average order from the retailer in 1922 was \$50.76 as compared with \$37.17 in 1926. In another group the average order in 1924 was \$33.42 in contrast with slightly less than \$30.00 in 1926. With respect to orders placed by the wholesaler, we find that in one group the average order of \$327.13 in 1922 had shrunk to \$248.19 in 1926.<sup>6</sup> The Institute of Economics

<sup>6</sup> *Hand-to-Mouth Buying*, Metropolitan Life Insurance Co., pp. 120-121.

has become interested in the problem and is now engaged in finding the actual extent of small order buying in the canning industry, which is supposed to have been seriously affected by the practice. Preliminary studies conducted by the Institute in other fields show contradictory results. In the steel industry it was discovered that there has been a very definite relationship in the past between price movements and buying policy, periods of rising prices being accompanied by a considerable amount of forward buying, and falling prices by slackened buying. In the tire industry from 1922-1924 a pre-dating system was used which protected the dealer from price cuts when orders were placed early, and during this period there was no complaint of short order buying. In 1925 the system was eliminated and hand-to-mouth buying appeared at once. In the textile industry, studies covering the period from 1868 to the present time indicate little connection between price movements and buying policy; hand-to-mouth buying was found both during rising and falling prices, but satisfactory buying was also found during both periods.<sup>7</sup>

#### DECREASE IN INVENTORIES

Of the alleged advantages referred to above, the one most commonly claimed is that inventories are reduced. It is relatively easy to develop a line of reasoning to show that hand-to-mouth buying should result in lower inventories; to secure statistical proof that this has occurred for any line of industry as a whole is much more difficult. We should expect to find the greatest improvement in the merchandising field, yet the most notable examples are in public utilities and manufacturing. In both of these lines

<sup>7</sup> *Canning Age*, Convention Digest Number, 1928, p. 215.

the arguments for, and the results flowing from reduced inventories, are different from those which apply in merchandising. In the latter, the chief danger in large stocks is that price declines due to style changes will result in heavy losses; in manufacturing there is also, of course, a certain degree of style hazard, but in both manufacturing and railroading the main advantage is the smaller carrying charges required for the lower inventories. The possible savings in this direction are enormous. According to President W. W. Atterbury,<sup>8</sup> the Pennsylvania Railroad in 1921

had about \$120,000,000 tied up in its materials and stores accounts, which, by 1926, was reduced to about \$50,000,000 by changing to a system of buying only for the requirements of a short period, and by a careful study of inventory control.

The actual reduction resulting, while it is not \$70,000,000, as would appear at first glance, but more nearly \$20,000,000, due to the changes in the price level, is nevertheless quite substantial and represents annual savings in interest of about \$1,000,000 or more. The practice has not been restricted to one road, however, Mr. M. J. Gormley, Chairman of the Car Service Division of the American Railway Association, being authority for the statement that four leading railroad systems handling about 24 per cent of the freight and passenger traffic of the country, are now carrying inventories \$140,000,000 below the peak inventory of a few years ago,<sup>9</sup> while A. W. Thompson, President of the United Gas Improvement Company, says that "in the public utility business there has been in the past six or seven years, a reduction in stocks

<sup>8</sup> Quoted in *The Girard Letter*, December, 1926, p. 3.

<sup>9</sup> *Hand-to-Mouth Buying*, Metropolitan Life Insurance Co., p. 14.



on hand, in many cases of as high as fifty per cent."<sup>10</sup>

Similar reductions have been made in other lines. The Bethlehem Steel Corporation, we are told, was able to build a \$35,000,000 plant addition from an inventory cut resulting from better inventory control.<sup>11</sup> The President of the Packard Motor Company says that his company, which in 1919 was carrying \$12,000,000 in current inventories of cars and parts, was able by 1926 to reduce this figure to \$3,000,000, by a careful analysis of all materials used, and by the establishment of accurate specifications as to quality and dimension, in spite of the fact that the daily production of cars increased from fifty to one hundred and fifty during the period.<sup>12</sup> Brice P. Disque, President of the Johnson Cowdin Corporation, manufacturer of ribbons, reports a reduction of \$600,000 in inventory because of hand-to-mouth buying on the part of its customers, the retailers.<sup>13</sup> In the retail field the savings have been larger, undoubtedly, but the proof is even more fragmentary. Mr. Disque cites a medium-sized store that in 1924 carried an inventory of \$11,000 of staple ribbons and by 1926 reduced the figure to \$5,400. Wheeler Sammons, President of the A. W. Shaw Company, Chicago, Ill., has made a careful study of conditions in various fields and recites some interesting examples, among others, that of a St. Louis department store that was able to cut \$1,000,000 from its stock, and of a hotel man whose savings amounted to \$350,000.<sup>14</sup> For the retail industry as a whole he estimated that better inventory control

has reduced stocks by \$1,000,000,000 since 1912. In spite of the fact that the extent of these reductions is exaggerated by price level changes, they have undoubtedly meant large savings in interest for the industry concerned, and the release of large amounts of credit for use in other fields, both of which work to the advantage of the consumer in the form of lower prices.

#### INCREASING THE RATE OF TURNOVER

One of the main purposes in reducing inventories is to secure a more rapid rate of turnover. To the retailer this simply means that he is doing more business with a given investment. One dollar turned twice will do the same amount of business as two dollars turned once and will yield the same total profit, but the rate of return on investment will be twice as great. If, then, hand-to-mouth buying is followed extensively, and if lower inventories prevail, we should expect to find not only higher turnover, but greater profits for merchants (or lower prices to consumers) as well. Some figures bearing on this problem have been collected by the Federal Reserve Bank of Cleveland in a survey covering twenty-six department stores in the Cleveland district for the years 1925 and 1926. This study shows that out of the fifty individual lines of goods carried by these stores, thirty-two showed an increase in the rate of turnover in 1926, while eighteen showed a decrease.<sup>15</sup> These figures are important in showing the situation as it existed in these two years, in this particular district, yet they do not cover a sufficiently long period of years, nor a large enough number of firms to be considered conclusive.

More comprehensive information is

<sup>15</sup> *Monthly Business Review*, Federal Reserve Bank of Cleveland, August 1, 1927, p. 5.

<sup>10</sup> *The Girard Letter*, December, 1926, p. 10.

<sup>11</sup> *Hand-to-Mouth Buying*, p. 104.

<sup>12</sup> *Manufacturing Industries*, August, 1926, p. 87.

<sup>13</sup> *Printers Ink*, September 30, 1926, p. 6.

<sup>14</sup> *Hand-to-Mouth Buying*, Metropolitan Life Insurance Co., pp. 104-105.



to be found in publications of the Bureau of Business Research at Harvard University. About 1914 this Bureau began to collect and publish data on operating expenses in retail grocery stores. In 1916 similar data relating to the wholesale grocery business were published, and in 1917 retail hardware stores were brought within the scope of the survey. Since then other branches have been included until now figures have been published for about eleven lines of trade. In the following table the rate of stock turn is shown for the various types of stores for which figures are available for any number of years.

change has occurred has not affected the rate of turnover in the way that has been claimed. Stock turn, however, is affected by such a multitude of factors that it is almost impossible to isolate the influence of a changed buying policy, particularly for the merchandising industry as a whole. The figure is undoubtedly affected by the stage of the cycle we are in, as indicated in the table above. Again, average figures are strongly influenced by the severity of competition, as gains by one organization may be offset by losses of another. Because of these considerations the relationship between buying policy and turnover is much

STOCK TURN IN VARIOUS TYPES OF STORES<sup>16</sup>

	Wholesale Grocery	Retail Grocery	Jewelry	Department	
				Net Sales Less Than \$1,000,000	Net Sales More Than \$1,000,000
1914.....	....	9.0	....	....	....
1915.....	5.7	....	....	....	....
1919.....	5.2	8.3	....	....	....
1920.....	6.1	....	....	2.7	3.7
1921.....	5.0	....	....	2.4	3.5
1922.....	5.7	10.1	0.8	2.4	3.7
1923.....	5.9	10.1	0.9	2.3	3.5
1924.....	....	10.0	0.9	2.5	3.7
1925.....	....	....	0.9	2.6	3.7
1926.....	....	....	0.9	....	....

<sup>16</sup> Stock turn is determined by dividing the net cost of merchandise sold by the average of the inventories at cost value at the beginning and end of the year.

#### TURNOVER IN SPECIAL FIRMS

These figures fail to show any noticeable trend toward higher turnover during the very years when hand-to-mouth buying was supposed to be making its most rapid development. If our conclusions were to be based solely on these facts, we should have to conclude either that there has been no decided change in merchandising policy in these particular lines for the years in question, or that whatever

easier to trace in one organization than in the industry as a whole. Turning then to individual stores, we find that one of the most outstanding improvements is reported by H. T. Parson, President of F. W. Woolworth, who says that his company in the last few years increased the turnover from five and a half times to nine and a quarter times a year.<sup>17</sup> The policy now is to carry a six weeks' instead of a three months' supply, with the result that

<sup>17</sup> *Magazine of Business*, March, 1928, p. 286.

about fifty per cent of the capital that used to be tied up in merchandise is released for other purposes. One policy that has aided in this speeding up in turnover is the elimination of unnecessary duplications in lines. Formerly thirty-two brands of talcum powder were carried, now only six, while the type of screw drivers has been reduced from twenty-six to six. This policy, it is claimed, has not only brought larger profits to the company, but has helped the consumer as well by enabling him to buy better and easier. Other methods used include the use of advertised goods, since they tend to sell themselves, and purchasing from domestic rather than foreign producers because domestic goods need not be bought in as large quantities nor ordered so long in advance as imported goods. Another example, not quite so remarkable, is that of a large store, which had a turnover of three in 1925, and increased it to five in the first six months of 1926 by adopting the small repeat order system made possible by the Kleanflax Linen Looms, Inc.<sup>18</sup> It is undoubtedly true that many stores have thus increased their rate of turnover by buying more frequently and in smaller quantity; it is very possible that corresponding improvement has been made in entire lines of merchandising, but figures are not available to support such a belief.

#### EFFECTS ON THE WHOLESALE AND MANUFACTURER

The injurious effects of small or "repeat" order buying are most frequently stated by the wholesaler and the manufacturer. Many manufacturers admit, of course, that the practice is desirable, within limits, but insist that it is dangerous if carried too far. If goods are ordered in small lots, and only as needed, the manu-

facturer is forced (1) either to manufacture for stock in anticipation of orders, and expose himself to considerable loss if the anticipated orders do not materialize, or (2) manufacture in small lots, as orders are received, and thus deny himself the advantages of large scale production. The latter policy is directly opposed to the traditional mass-production methods upon which American industry has been developed. It is also opposed, it is claimed, to modern scientific management, which requires detailed planning of production. Steel manufacturers, for example, complain that in 1926 orders were delayed until the material was actually needed, and as a result, "mill schedules could seldom be completed by as much as a week in advance."<sup>19</sup> Smaller and more frequent orders, therefore, mean higher costs of production, not only because it is impossible to produce small quantities as cheaply as large, but because their emergency nature prevents long-distance planning. Temporarily, says the manufacturer, these higher costs may simply absorb my profits, but ultimately they must be passed on to the consumer in the form of higher prices.

Some even go further, and assert that the practice results in more rather than less instability in business. With definite orders in advance the manufacturer is able to engage in production during the quiet season, which permits him to take advantage of the low prices that prevail at such times, and also enables him to retain an experienced force of workers. In the absence of such advance orders, it is unsafe to buy raw materials, and as a result the prices of such material are subject to more violent fluctuations; without orders, the plant must be closed down and workers dismissed.

<sup>19</sup> *Hand-to-Mouth Buying*, Metropolitan Life Insurance Co., p. 37.

<sup>18</sup> *Printer's Ink*, September 30, 1926, p. 6.

Those who favor the practice point out that these dire consequences need not occur if the manufacturer will take his proper share of the risk and responsibility, and produce a certain minimum for stock. They assert that in the past the retailer was forced to assume the entire task of forecasting demand; now he is merely placing a part of it where it really belongs—on the manufacturer. The manufacturer replies that he is perfectly willing to bear his proper share of the risk, but that the policy has been carried so far in recent years that the retailer has become a mere order-taker, who performs no service, but merely transmits orders for goods to the manufacturer as they are received from the public. It is possible that some retailers, in their enthusiasm for small orders, have gone too far, but experience must soon show them that profits come only as the result of sales, and that sales are made only if goods are on hand just when consumers want them.

In attempting to weigh and analyze these arguments, there are a number of factors which must be kept in mind. In the first place, we must realize that conditions vary widely from industry to industry, and that a buying policy which has admirable results in one may be disastrous in another. Some of the factors that have a bearing on the subject may be listed as follows:

- (1) What is the type of goods produced—producers' or consumers' goods?
- (2) If a consumers' goods, is it a staple product, of some rather definite standard as to material, size, color, etc., or is it a style product?
- (3) Is the demand concentrated in a short season, or is it evenly distributed throughout the year?

- (4) Can it be manufactured for stock to advantage, or is this prohibited because the article is perishable, or subject to risk of style change?
- (5) What makes up the largest element of cost—labor or materials? Is the cost mainly fixed, or variable?
- (6) What is the source of the raw materials from which the product is made? Is the supply seasonal? Are the materials perishable?
- (7) What is the length of time required for the manufacturing process?

It is impossible at the present time to find by inductive study how each of these factors is affected by the buying policy, but it is possible to indicate it by deductive analysis. The proposition to be taken as the starting point is rather obvious. That is, if the commodity is standardized and is consumed or used at a regular rate throughout the year, and, if raw materials are uniformly available, hand-to-mouth buying will have little effect on either production or price. The manufacturer knows just about how much the total demand for the year will be, and is able to plan for continuous production without regard to the buying habits of his customers. When consumption is seasonal, or highly concentrated in certain periods of the year, the problem is more complicated. If the product can be stored without risk of deterioration or style change, continuous production may be engaged in as before, with little reference to orders, but if either of these conditions is not true, manufacture in anticipation of orders is too risky, and the opportunity for small repeat orders is much restricted. In such cases, postponement of orders to the last minute means that manufacturing costs will be in-

creased, and that some people must do without because there are not enough goods to go around.

The real problem comes in connection with unstandardized goods, or those that possess a large amount of the style element. Both manufacturer and dealer desire to avoid the risk of making a wrong forecast and they try to shift the task to the other. Accurate style forecasting tends to reduce price fluctuations, while every mistake increases the variations by forcing down the price of the unwanted goods, and exaggerating the rise of those in great demand. The decisive question, then, is this: which is in a position to make the most accurate and intelligent forecast—the manufacturer or the dealer? The latter has the advantage of coming in closer contact with the consumer and can observe trends in taste more quickly and accurately, but the manufacturer usually has greater resources of wealth and the managerial ability required to make exhaustive surveys. Where the manufacturing is carried on by a few large and strong units, and distribution by a number of weak and widely scattered dealers, hand-to-mouth buying will likely lead to more stable prices, for it forces style forecasting on the shoulders of those most capable of doing it—the manufacturers.

The length of time required for the manufacturing process is also an important factor and is closely connected with the style problem. When goods can be turned out in a few days' time, postponement of orders until the consumer actually begins to call for them is not particularly serious. Of course, the manufacturing process is hurried, overtime work is engaged in,

and much waste results, but prices are not apt to rise very high or remain on a high level very long because goods will soon begin to flood the market. But if a long time is required to fabricate the commodity, the result of small order buying is not so clear. If three months must elapse before the goods are completed, some one must take a chance in order to have a supply on hand when needed. Again the result turns on the intelligence of the two classes, the dealers and the manufacturers. In the past, advance ordering by dealers who were ignorant of actual market trends, has often led to extreme swings in price. If hand-to-mouth buying takes from them the responsibility for analyzing the market and places it upon the manufacturer, fluctuations might be reduced.

It is unnecessary to enter into a detailed discussion of the other factors listed, for enough has been said to indicate what the line of attack should be. In some cases hand-to-mouth buying tends to make adjustment of production to consumption easier, and in some cases more difficult. On the whole, it should be looked at as a stabilizing influence. It tends to throw on those most capable the task of analyzing market conditions to determine what and how much will be demanded. At the same time, it indicates that speculation is not as prevalent among distributors as formerly. So long as the dealer orders only as needs appear the producer will not be misled by duplicate or pyramided demand, and will be able to adjust production to active consumer demand, which is the prerequisite to any plan for stabilizing price.



# Commodity Price Stabilization as a Problem of Insurance

By G. WRIGHT HOFFMAN

Assistant Professor of Insurance, Wharton School of Finance and Commerce, University of Pennsylvania

THE problem of price stabilization is primarily a problem of insurance. The field of insurance properly comprehends all phases of economic risk. This includes the original incidence of the numerous types of risk, their elimination where possible, and their assumption or distribution where elimination is either not possible or not practical. Used in this broad fundamental sense, insurance is synonymous with *assurance*; and the problem of price stabilization becomes a problem of developing a greater degree of assurance regarding the future course of prices.

The price hazard is, of course, only one of the many elements of economic risk though an extremely important one. The annual premium outlay in the United States covering the risks which can be insured now exceeds five billion dollars. Using the estimate of the National Bureau of Economic Research of ninety billion as our total annual income, the present expenditures for insurance amount to over  $5\frac{1}{2}$  per cent of our national income. This estimate does not include a vast field of expenditures annually made by organizations, other than insurance, to prevent or eliminate outstanding hazards.

Important as are the present insurance expenditures, they are only a start in the adequate handling of the element of risk. It is an arresting fact that the nation which leads the world in the total and per capita production of wealth is at the same time the outstanding leader in the annual destruction of property by fire and in the annual

impairment of life through industrial and public accidents. Our captains of industry are masters in speeding up production and distribution, but too often to the disregard of the hazards and the attending costs incident thereto. With respect to the price hazard in particular, a condition of mal-production is continually encountered, destabilizing prices and shifting, in uncertain fashion, the annual streams of income. A prominent authority, W. I. King of the National Bureau of Economic Research, estimates that the shifting of wealth growing out of the general decline of prices in the fall of 1920 and the spring of 1921 amounted to forty billion dollars. The elements of risk, and in particular the problems of price uncertainty, are certainly deserving of the most thorough study.

## NATURE OF THE PRICE RISK

Price uncertainty is an outgrowth of the practice of producing goods in anticipation of demand. In the earlier and simpler forms of economic life, where very little exchange of goods took place, there was no problem of changing values. Under modern methods, this, of course, is not true. Profitable production today requires that individuals and communities not only become specialists, by each producing a few types of goods, anticipating an exchange with others for the remainder of their needs, but also that they produce these goods months, and sometimes years, in advance of their consumption. This requires in almost every field of economic endeavor, the assumption of



an important risk, viz., that values may change in a way not anticipated during the interim of production.

To heighten this hazard of changing values is the fact that these values are expressed in terms of a shifting monetary standard, making the risk one of relative changes in prices. A producer of a particular type of goods may find after they are finished that their price has declined below their cost of production. So, also, one engaged in placing goods where they are needed or holding them until they are needed may often find his judgment of demand at a particular market, or at a particular time, in error, resulting in heavy financial loss.

It is not in place here to enter into an analysis of the forces accounting for variations in demand. It is sufficient to point out that they grow out of continual changes in the choices and in the purchasing power of consumers. Price is thus the intermediary between consumption and production. It is the governor which regulates not only the speed with which our productive machinery shall run but also the relative amounts and varieties of goods which shall be produced.

Quite naturally, therefore, those engaged in business in particular, watch the market trends in the prices of the products they are handling. If prices are tending upward, profits are large; if downward, losses result. In this they attempt to estimate probable demand as far ahead and as accurately as possible. Yet on the whole, forecasting of demand and of prices on the part of individual business enterprises has been, up to the present, a very unsatisfactory affair. A very few enterprises have the faculty of sensing, amid the scores of changing and conflicting market factors simultaneously at work around them, just what the next price move will be. For the great

mass of producers, the process is one of blindly feeling their way forward. To them changing price levels means all too often either unusual profits or failure. To the great mass of business endeavor, changing prices are, thus, by far the most important of all business risks.

#### METHODS OF MEETING PRICE RISK

As a result of this roundabout, anticipative method of production, every phase of business enterprise is continually forced to account for unforeseen changes in price. This accounting necessarily falls into one of three classes: (1) The enterprise may decide to continue to carry the price risk itself; or (2) it may attempt to eliminate the risk in part or wholly; or (3) it may shift the risk to the shoulders of some interest or group specializing in risk-bearing. Let us consider each of these forms in turn.

#### *Self-Insurance*

In favor of the first method, as usually carried out, not much can be said. This is not because the method is theoretically unsound, but rather because the plan too often is not properly executed. To carry the price risk oneself, a plan of self-insurance must be carefully formulated and rigidly followed. For the average firm this requires, among other things, expert guidance to measure the extent and probability of loss, the distribution of risk, and the reinsurance necessary to cover excess loss. It requires usually the establishment of a separate insurance division and the setting up and continual maintenance of adequate reserves.

A mere enumeration of these "first principles" is sufficient to reveal the weakness of the plan for most small or average-sized enterprises. Almost always, there is inadequate provision for

the future through the creation of real reserves. In many cases this is doubtless due to a lack of foresight into the future; in others, it is a matter of overabundant optimism. But, in any case, unless the plan is carefully devised and operated, self-insurance lapses into no insurance, and the carrying of risk becomes simply a matter of chance.

The development of practical self-insurance plans offers an unusual approach to the problem of price insurance. To be a practical success, however, every plan must demonstrate in actual operation the ability to meet important losses without seriously impairing the financial or operating efficiency of the enterprise employing it.

#### *The Elimination of Price Uncertainty*

The second method of handling the price hazard is by eliminating the risk in part or in whole. Obviously, the extent to which this plan can be successfully used depends largely upon the type of business. In certain types of enterprise such as the milling business, the manufacture of food products, and in some branches of the textile trades, it is possible to maintain an even balance between the purchase of raw materials and forward orders for finished product. This is the practice, for example, of one of the largest corn products companies of the United States. By buying corn only as orders for their products are received, they are at no time exposed to the hazard of price fluctuations.

It should be observed, however, that while this plan is referred to as eliminating the price hazard, it is an elimination only for the particular business units using it. It is more properly described as avoiding the price risk since the risk is in no measure diminished, but only shifted to other hands no better prepared to assume it than those from whom it was transferred.

Under this head might be classed, also, those instances in which individual business units attain some measure of success in forecasting price changes likely to affect them. Where the organization is large enough to afford a thoroughgoing statistical department, such as that maintained by the American Telephone and Telegraph Company, excellent results can be secured both in the elimination of the price hazard and, where this is not possible or does not seem advisable, in the meeting of the problem through a well formulated plan of self-insurance. If the present trend in the integration of companies continues, this method should also grow in importance. It is not a plan, however, that can be readily employed by smaller companies and in this respect it reveals the same weakness as that of self-insurance.

#### *Insuring the Price Hazard*

There is available a third and final plan of handling the price hazard: to shift the risk to the shoulders of some interest or group specializing in risk-bearing. In considering this third plan, it is in place at the outset to emphasize a fundamental distinction between this and the first two plans. Under the third plan, the risk is carried by an interest or group assuming it as a professional task. Under the first two plans, the risk is either carried as a necessary part of the business or shifted through purchase or sale of goods to others who carry it as a necessary incidental (though often an important one) of their regular business.

Enterprises in manufacturing, grading, storing, assembling, and financing, usually assume a measure of price hazard and in the cycle of production are continually shifting this hazard, yet they are not professional risk-bearers because the risk is assumed only as a necessary incidental to their

regular business. In contrast the principal function of the professional speculator, of organizations of the type of Lloyds of London, and in particular of our regular insurance companies, is that of assuming risk.

Consider, then, to what extent professional risk-bearers are willing to assume the price hazard. With respect to our established stock and mutual insurance companies, very little insurance is being offered at the present time directly covering the price hazard. By "directly" is meant insurance having as its main purpose the covering of unforeseen price changes. There are certain types of contracts, which, in the event of loss occurring due to the primary hazard insured against, also may cover a measure of loss due to price decline. Such is sometimes the case, for example, with hail insurance, in states having valued policy laws. Having taken out a \$2000 policy covering a crop having at the time a prospective value of \$2000, if as the season advances the market declines and then a total loss due to hail is sustained, the \$2000 contract indemnifies the insured in part for loss due to hail and in part for loss due to decline in market price. Similarly in marine insurance, and particularly policies endorsed "policy proof of interest," one may find an occasional loss in which the payment serves in part to cover loss due to a market decline in price. All such cases, however, are contingent upon the occurrence of the main hazard or hazards and where this is not the case, loss occasioned by price changes is not covered.

There are also a few other limited instances in which the price hazard is included either directly or indirectly, but they are of minor importance here. Contracts of crop insurance guaranteeing a crop worth at least a prescribed value per acre have been issued in re-

cent years. While not specifically mentioning the price hazard, these contracts are often so worded that a decline in price sufficient to lower the value of the crop at harvest time below the insured value will be covered. There is also being issued a contract of land-value insurance which includes the price hazard. With reference to Lloyds of London and similar organizations, individual contracts are sometimes written covering the price risk to fit a particular situation, but no standard plan has been developed to meet satisfactorily the need for this type of coverage. These are isolated instances and in the main leave the problem of price insurance unsolved.

#### MEETING THE PRICE HAZARD THROUGH HEDGING

In reviewing the methods of insuring against unforeseen price changes, more than passing reference should be made to the place of organized speculation in commodities. While trading in these articles is maintained purely as a means of profit, it so happens that the facilities also afford a means of price protection. In the terminology of the trade, this insurance device is known as hedging. It is in widespread use at the present time in both the grain trade and the cotton trade, particularly, by millers, by terminal elevators, by cotton merchants and shippers, and by exporters.

As an illustration, in the fall of the year, terminal elevators purchase grain to store and merchandise for the purpose of earning a trade profit. This grain, bought to the extent of millions of bushels, and largely on borrowed capital, places the elevator companies in a position where a minor price decline, of only a few cents per bushel, means certain loss of profit, and a major decline, bankruptcy. It is accordingly the practice among terminal

elevators to sell futures to an amount equal to their actual holdings of grain (less of course any forward orders they may have outstanding). The day-to-day and even minute-to-minute fluctuations in the future market usually have their counterpart in the market for actual grain. The result is that losses sustained through a decline in grain prices, on the grain held in store, are offset by gains through futures sold as a hedge, since they can now be bought back at a profit. If grain prices rise, on the other hand, the gain on the actual grain must be used to meet the loss on the futures.

There are then in this process two risks assumed which counterbalance each other. The elevator company owning and holding in store a supply of grain to be sold later is carrying the risk of a price decline. It neutralizes the force of this risk to itself by assuming another risk the counterpart of the first, thereby shifting the existing risk to a second party. This second party, it should be noted, assumes the risk solely to reap a possible profit and is, therefore, a professional risk-bearer in the transaction.

Through a period, now covering several decades, there has been built up around these organized exchanges, a body of speculators, whose single function in buying and selling futures is that of assuming the risk of a change in the market price of the commodities traded in. Like any other enterprise, some of the group profit and others do not. But in their individual efforts to foresee future trends in prices detailed specialized knowledge has developed. Direct private telegraphic connections have been extended to all parts of the United States and to foreign countries. There are few lines of economic endeavor in which so systematic an attempt is being made to obtain all of the important facts likely to affect

market opinion as in the grain trade and in the cotton trade.

#### THE OUTLOOK FOR PRICE INSURANCE

Reference has already been made to the possible extension of plans of self-insurance designed to cover the price hazard. It is possible, also, through individual effort and particularly through research organizations, to minimize and, in some instances, eliminate the uncertainty of price changes. Finally it is possible, through the extension of the principle of hedging and the development of the usual form of insurance, to greatly enlarge the rôle of the professional risk-bearer in meeting the problems of price uncertainty.

With reference to the extension of the principle of hedging, the field having the greatest possibilities is that of stocks. Owing to the fact that short selling in stocks is carried out through the borrowing of shares instead of selling for postponed delivery, our stock exchanges as now organized are not adapted to hedging. Were it possible to buy and sell stock futures and in large amounts, a great many could minimize greatly the present risk of price changes. By a careful grouping of shares of a similar character it would be possible to arrange an effective hedge for industries of almost any type. This would not serve as a solution to the business cycle if by a solution it is required that periodic movements in prices be removed. It could serve to place the uncertainty of price changes in the hands of those willing to assume the risk; and if those supplying the rôle of insurer were more expert as a body in their insight into the future, it certainly would serve not only to diminish uncertainty among producers, manufacturers and merchants, but also to materially decrease the range of the business cycle.

It is difficult to appraise the possi-



bility of meeting the price hazard through the ordinary plan of insurance. There are few important precedents to point the way. One might suggest, for example, the use of an all commodity index to measure the risk of general price changes. The insurer could guarantee to a merchant, for example, that if prices fell, during the life of the policy the indemnity to be paid would be measured by the index used. Similarly the insurance company might guarantee to the purchaser of a twenty-year endowment policy that the sum to be paid at death or maturity will be at least equal in purchasing power to its value at the time the policy is issued. This is not a new suggestion, nor does it entirely lack precedent. For example, the Rand Kardex Company before its merger issued a bond, in which the principal and interest were measured by an all commodity index. But it is a question how effectively a policy of this kind would cover the insured's price risk.

So also an insurance company might issue a policy insuring against price decline (or price advance) for a specific

commodity. This, too, is not without a measure of precedent. It is of interest to note that in the most recent McNary-Haugen Bill, there was included a section designed to supply insurance by the Federal Government against a seasonal decline in the price of cotton. Other bills were also introduced proposing simply to fix a guarantee price by the Government for certain agricultural products.

These are proposals strongly suggesting the need of price insurance. They suggest also, that, for agriculture at least, if the present price gamble is not met through private initiative, that some form of Federal guarantee will be developed. There is no reason to believe that a contract carefully drawn, supplying adequate indemnity in the event of unusual loss, could not be profitably issued and developed as an important line of private insurance. With the accumulation of experience and the adapting of the contract to wider fields, there is every reason to believe it would successfully solve many problems of price uncertainty.



# The Rôle of the Banker in Guiding Production

By J. W. BELL, PH.D.

Professor of Money and Banking, Northwestern University

**B**ANKERS are often accused of exercising an undue influence over industry and trade. There are periodic outcries against the power of the "money trust" of Wall Street, which epitomizes banking, and now the Federal Reserve System is made the butt of much censure. Though many well-meaning but exaggerated criticisms are often due to a confusion of the "seen" and the "unseen," as Bastiat might say, it is undoubtedly true that the rôle of the lender becomes more powerful as capitalistic production increases and borrowing becomes a more essential and universal-feature of the process, and the power of abuse grows *pari passu*. The aim of the banker is, or should be, to aid all branches of business, the consumer as well as the producer, merchant and manufacturer as well as the farmer, with absolute impartiality. That this aid is not always impartially rendered, is often due to the lack of coincidence between needs for credit and ability to pay the best market price for funds. So long as our society is organized on a competitive, profit-making basis, dissatisfaction on this score is bound to occur.

## STRATEGIC POSITION FOR GUIDING PRODUCTION

The banker occasionally exercises dominant control over the affairs of his customers, but such situations are abnormal, and arise only during periods of credit strain, when borrowers need funds almost regardless of terms. In extreme cases, the creditor virtually dictates the policies of the borrower's business, and even changes the management. The reverse situation exists during periods

of recovery, after extreme liquidation has taken place, and bankers find themselves with idle funds and low yielding assets. Under these conditions the borrower has the advantage of bargaining position and may impose oppressive conditions upon the lender.

The power of the banker is limited in several respects. In the first place, the credit contract entered into between lender and borrower is usually a voluntary one to which neither party will submit unless beneficial results are anticipated. Credit transactions, like all trade, should be mutually advantageous. In the second place, the business man will not borrow so long as his own funds are ample to meet all needs. It is not uncommon to hear of old established firms who never borrow from banks. Until business customers borrow the bank has no "veto" power over the use of borrowed funds. This point suggests the fact that the main credit system of the country is really quite outside the banker's sphere of influence, namely, trade credit and the great capitalizations of industrial and commercial corporations. As Walter Leaf states it:

The banks deal, in fact, only with the bare fringe of this great mass of credit, the result of centuries of thrift and of profits put into the stock of the country's capital . . . it may be said that the deposit banks live entirely on capital that people do not want at the moment.

The banker is limited also in his clientele. He has to do business where he is located, and is called upon to serve the trades and occupations represented in this area. He must observe their customs and practices, the terms of

sale, and the like, with little modification. If he makes advances outside, it is in competition with others, who may be better informed than he is about the values back of credit risks.

Within these limitations the banker has ample scope to exercise discretion, and in our economic organization he has the opportunity of becoming a co-ordinating agent, encouraging this profit-making project by offering liberal credit terms, and discouraging that weak and speculative venture by refusing financial assistance. In this manner under-production may be remedied on the one hand and over-expansion prevented on the other, and the uneven development of business enterprise in various fields, and at various times, be mitigated. In fact, the prudent banker, with wide and general information about finance, production, marketing and consumption, may well become, in Veblen's phrase, a member of the "class of pecuniary experts, whose business is the strategic management of interstitial business relations of the (economic) system."

Under conditions of competition and freedom of contract, production for the market, often far in anticipation of demand, involves great uncertainty and risk of error. The business man cannot be expected to master all these outside forces in addition to the internal affairs of his own enterprise. The banker must aid. His intimate contact with other businesses and other industries gives him a basis for forming broad judgments. He has at his service specialists, credit men who perform a technical function analogous to that rendered by engineers to industrial concerns. He receives support from numerous business and financial services which publish much of the essential data relating to business conditions. In short, the banker should be able to relate the affairs of the indi-

vidual business man to general market conditions, account being taken of prospective changes, as well as the actual conditions. His counsel and advice is usually listened to with consideration and respect; he is increasingly looked at as a silent partner in the business. The banker can do much to bring more order into what critics often refer to as the "alleged planlessness of our competitive, capitalistic, profit economy."

#### GENERAL FUNCTIONS

In the broadest sense of the term the essential functions of bankers may be classified under two heads: (1) financing trade, that is, short-time advances on credit to cover raw materials and goods through the various stages of production, transportation and marketing; (2) investment financing, the loaning of money for longer periods of time, usually to provide capital equipment for industry and governments.

The purpose of both commercial banks and investment institutions is to combine together in effective ways, capital and business ability separately produced, since if no credit were available a business man would have to operate with his own capital and would not be able to specialize entirely in the development of his peculiar capacity. By the aid of credit institutions, society's productive capacity is increased through the breaking up of its work into more elementary parts.

Whether the loan be long or short time, advanced by investor or commercial banks, the benefits derived from such a transaction should be reciprocal. If the loan be sound it confers means whereby the debtor can buy and sell at a profit and repay principle and interest out of the proceeds; or it enables him to build up his permanent assets so as to increase his earnings and thus insure his ability to pay interest and amortization at agreed rates. At maturity,

when the loan has been fully paid, the lender should have his money back with interest, and the borrower should have cashed in his transactions at a profit, or have enlarged his assets and earning power. The terms of the loan should be neither so oppressive as to make the borrower pay too dearly for benefits received, nor so lenient that the lender receives a smaller return than the risk involves, taking into account possible uses for money and prevailing money market rates.

#### DIRECTING THE USE OF CREDIT

Like so many other economic problems, this question of bank loans may be approached from the sides of supply and demand. On the supply side we have the net lending resources of the banker, and on the demand side we have the credit-worth of the borrower upon which bank advances are based. The latter will be treated first.

Advances made by banks to customers are of the most varied nature and cover the whole range of commercial and investment needs. They vary from long-time loans running up into the millions needed by government or huge business corporations, to short-time advances of a few dollars, to some hard-pressed customer. Practice differs in different countries. Some of the largest and best known banks in Europe, especially in Germany and France, not only use their institutions for ordinary loan, discount and acceptance credit, but also for the promotion of new enterprises, during their initial or speculative stages. In this country, and in England, bankers are limited more strictly to short-time loan and discount functions, and capital necessary for promotions is usually obtained from groups of financiers, formed for the particular purpose. Securities once issued and seasoned, however, are becoming common investments for American banks, and

the close affiliation of some of our larger banks, with subsidiary security companies, points toward a tendency to do all-round financing, as is done on the continent. In England it is still the cardinal principle of sound banking to strictly limit advances to short-time maturities. Where depositors' money is withdrawable, either on demand or on short notice, prudence dictates that it should not be invested in securities nor loaned on collateral that cannot be easily liquidated. Checking accounts are uncommon on the continent, hence investment advances can be made there with greater safety.

Advances of commercial banks are made on a great variety of security—real estate, stock and bond collateral, commodities, personal guarantees, or the unsupported credit of the borrower. In any case the banker makes an analysis of the borrower's credit worth whether based on personal or property values. It may be perfunctorily done by rule-of-thumb methods, or it may be scientifically undertaken with a view to accurate forecasting of the results.

Personal or character loans are indeed common, but for his principal customers the banker receives regular financial statements which are analyzed with care. The technique of credit analysis is becoming more and more perfected. Qualitative analyses are made of each important item to obtain proof that they represent the actual financial condition of the business. And when the soundness of each item is determined, quantitative tests are applied, *i.e.*, items or groups of items are compared, present with past statements, to give a running account of the progress made in the business, and to show relationships which may be compared with averages or standards of practice familiar to firms in the same business and locality.

Bankers thus become closely ac-

quainted with the specific terms of sale, normal rate of turnover, length of collection periods, extent of loans necessary, and the earnings and profits of their customers. Wisely applied this knowledge works a most salutary effect on business stability. To take a single example, namely, the analysis of what is to the banker the most important balance-sheet relationship, the "current ratio": Let us suppose that the banker, with his knowledge of a certain business, is satisfied that under what might be called normal conditions a ratio of 2 to 1 is perfectly safe, which means that he does not anticipate that any ordinary shock will cause current assets to shrink more than 100 per cent. But assume further that the banker knows also that this particular industry is threatened with over-expansion, that price-cutting and cancellations may be imminent, and collections doubtful. What would this prudent banker do if the following relations were shown on the customer's statement?

## CURRENT POSITION OF CUSTOMER

Cash.....	50	Payables.....	100
Receivables.....	50		
Inventory.....	100		
	<hr/>		<hr/>
	200		100

The 2 to 1 ratio would be safe, allowing for ordinary contingencies only, but with great uncertainty ahead, the probability of larger shrinkage of assets should be taken into account. This may be done either by requiring a higher ratio, thus increasing the margin of security, or the same ratio may be required in figuring the amount of the loan, and each item discounted as nearly as may be, to show the estimated possibility of shrinkage. If, for instance, the possibility of shrinkage of receivables was estimated to be 20 per cent, these claims should be counted as worth, at maturity date of the proposed advances, only

80 per cent of their present value. Cash obviously would still be worth 100 per cent. inventories might shrink most. Payables would remain at \$100, since no shrinkage should be allowed in the case of liabilities. The result may be shown as follows:

## CURRENT ASSETS

	Present Value		Discounted Value in per cent		Future Value
Cash.....	\$50	×	100	=	\$50
Receivables.....	50	×	80	=	40
Inventory.....	100	×	60	=	60
	<hr/>				<hr/>
	200				150

Either method gives the same answer and shows the condition of the statement unsatisfactory evidence to support further loans, the advantage of the second method being simply that it is sometimes more exact.

The effect of such analysis is to deny credit to those concerns with relatively weak cash position, low current ratios, non-liquid assets, slow collections, weak net worth, and with poor earnings and profits; and to encourage customers with liquid and profitable businesses to expand their operations. In this way a good many risks of "frozen" and unsound loans could be avoided, and at the same time the labor and capital of the community would be directed into businesses and industries where the future looks brightest and where it can be most effectively used. Indeed business conditions are constantly changing as students of business cycles have amply demonstrated. Bankers more than any other group are interested in anticipating or making allowance for these prospective changes.

ACTION TAKEN DURING PERIODS  
OF CREDIT INFLATION

During periods of prosperity when all business operations have become expanded the banker should scrutinize



with even greater care the liquidity and safety of his customers' position. Production and prices are likely to be at high peaks, and the risks of price decline, and the necessity of liquidation are therefore very great. This is the phase of the business cycle when the banker should put his house in order. He has the whip hand, since nearly every producer is now a borrower, and he can afford to be strict and selective in his risks.

If the spirit of inflation is rife, and the credit resources of the banks of the country are threatened with exhaustion, and unavailable when they are really needed, and if conditions look ominous and risky because of the expansion that has taken place and the speed with which prosperity is traveling, the prudent banker should make the following moves to avoid possible disaster: first, he should try to get his assets in more liquid condition so that he would be able to pay cash when cash demands become heavy. He should sell his poorest and most speculative securities; bring pressure to reduce holdings of "Kathleen Mavourneen" paper—as some writer has called it, since "it may be for years, and it may be forever,"—pay off borrowings with correspondent banks and clean up bills payable at reserve banks. He should get his earning assets into short maturities and gilt-edge marketable paper, diversified and safe. He should suggest a similar plan of action to his customers: advise against too great extension of capital, large inventory, heavy commitments of raw material, large labor and sales forces, over-extended and ultra-liberal credit terms to his customers. After depression the banker would naturally take the opposite tack. Before the Federal Reserve System, when all banks found themselves in such extended condition, there was no remedy and suspension of specie pay-

ments followed as a matter of course, since the only available resort for the liquidation of their assets was the stock market, and that delicately poised mechanism was unable to stand the shock, for the simple reason that money to buy securities had to come from the banks themselves.

#### THE SUPPLY OF THE COMMERCIAL BANKER'S LOANABLE FUNDS.

The bank's resources consist of lodgments of cash and credit collected from the public, partly for interest, partly for check-making facilities, and these are compounded with the bank's own capital and surplus. If the cost of supplying the funds is cheap the banker will be liberal with his credit until he has put to work as large a proportion as he dares; if costs are high and resources limited he will have to charge more for the use of funds.

The supply of loanable funds immediately available for advances is a relative quantity, and depends not only upon the amount of cash, but also upon the advances previously made. The present position is shown in the reserve ratio. If the reserve ratio is high it is an indication of cash available for loan or investment expansion; if low, care must be taken lest more cash obligations be assumed than can be met. The practical limit recognized in this country is commonly that determined by the minimum requirements of the law. Bankers lend up to that limit and stay there. Figures show very little latitude between actual and minimum legal reserve ratios. When a bank needs more cash it sells assets or borrows from others. The demand for bank credit originates with the borrower, who must satisfy the banker that he will, and can, pay the loan when due.

Obviously if it becomes difficult or impossible to sell or borrow, the banker's supply of credit becomes limited or ex-

hausted and he must curb or check sharply his advances.

#### CONTROL OF THE VOLUME OF CREDIT

Since the profit motive caused individual commercial banks of the country to keep resources employed up to the limit allowed by the legal minimum reserve ratio, it proved necessary to establish a central controlling agency to regulate the total volume of credit in use without regard to earnings, but to the end that business and commerce be supplied with an elastic and safe supply of credit at all times.

The reserve banks were created for this purpose. They are not and should not be operated as profit-making concerns. Regular and full employment of their lending resources would leave no surplus reserve for emergencies, and would not enable them to supply credit when needed to steady business conditions. Federal Reserve Bank practice differs in marked degree from that of the ordinary commercial banks operating for profit, and it is fortunate that the necessity for large and regular earnings is becoming a discredited principle.

The reserve banks control the volume of credit in use by regulating the amount extended to member banks. Deposits to member banks, reserve accounts at the Federal Reserve banks, instead of cash on hand and on deposit elsewhere, now form the only legal reserve for commercial banks' credit expansion. Since member bank or primary credit remains fully employed in investments and loans, any change in Federal Reserve or secondary credit will affect the volume of the whole. Thus Federal Reserve credit supplements member bank credit.

The reserve banks compete directly with member banks only in regard to dealings in government securities. In no other way does reserve credit get

into use for business purposes through the voluntary action of the reserve banks. This seems like a dangerously broad statement, but it may be supported by the following analysis.

Federal Reserve Bank credit gets into use in two ways, and in two ways only, viz.: through member banks and through open market operations. The reserve banks may discount or buy eligible bills and securities from either source in exchange for reserve credit or reserve notes. If they buy these assets from members they do so passively, since they must wait for offerings. Open market purchases may be made voluntarily, but in practice the reserve banks do not compete aggressively, but again await offerings, so that on occasions when the credit needs of business are adequately supplied by member banks, the reserve banks are obliged to rely upon purchases of government securities to alter in any manner the supply or volume of reserve credit.

Like the price of everything else, the price of credit (interest rates) is affected by changes in supply, and it is in effecting changes in supply or the control of the *volume of credit* in use that the reserve banks can influence production and business. The principles governing the credit policy of the reserve banks are the same as those employed by the member banks, but as indicated above the object or aim is not to make profit, but rather to aid business. Stabilization of prices is one object, stabilization of production is another, employment and trade, and foreign as well as domestic business conditions are other factors influencing Federal Reserve policy. Briefly stated these objects are attainable in a very significant degree by recognizing the following precepts.

In order to change the supply of credit in use the reserve banks must always have a substantial amount of re-

sources with which to operate. A large portion of this must be legal tender gold, which is the basis of all credit forms of circulating media, acceptable as money. In their vaults also they have earning assets of unquestionable security and of a high degree of liquidity, *i.e.*, readily salable, without significant shrinkage in value, in well organized markets, or of short maturity which automatically convert themselves into cash at the end of the business processes which form the basis of the transactions originating them.

With these assets the reserve banks are in a position to regulate the supply of credit. On the one hand they have credit resources to expand, and by re-discounting and lending and buying bills and securities can increase the total volume of notes and deposit credit up to two and a half to three times their legal reserve; on the other hand they can contract the volume of credit in use by allowing this paper to run to maturity without renewal, curbing further borrowing by refusing to buy, or by lending at higher discount rates, or by selling the securities they have on hand. By these methods reserve credit can be put into circulation and can be called back again. But reserve banks can in no way control the use of credit except by manipulating the volume of the whole. Member banks and businesses using credit determine how credit will be employed.

The principles of sound credit policy to the end that production may be stabilized are indeed easy to state: (1) the *quality* of credit should be in harmony with permanent values, that is, goods and services bought with borrowed funds must be, broadly speaking, sufficiently productive to furnish income at the end of the credit period in excess of the repayment to be made. It should be employed for legitimate purposes

and in those enterprises where it can be most effectively used and where the need is most urgent—the test of *need* in our economic organization being, for better or for worse, prospects of profitability measured by credit worth. Excess or overissue of credit enables expenditures to exceed the income therefrom and reduces the margin of safety essential to financial success; judgment concerning the factors of uncertainty and risk involved in making the advance is the true test of the banker and the investor. (2) Regulation of total *quantity or volume* of credit is likewise necessary to stabilize production and prices. Credit must be sufficient to keep the wheels of industry running smoothly on a fairly even and stable price level, but not so excessive as to cause inflation. With our improved banking system we have learned to minimize the danger of financial panics and we must now try to control industrial fluctuations and crises.

The types of credit machinery devised to administer the supply and distribution of credit, though complicated so far as institutions and agencies are concerned, all have similar functions to perform. The long time or fixed capital needs of business are financed through investment houses whose specialty it is to estimate or determine the probable productivity or earning power of the property which is the basis of the loan; the commercial banks furnish short-time advances to finance working capital needs. These two institutions are responsible for the *use* to which credit is put.

A special supply of liquid credit is created and regulated by the reserve banks so as to afford greater elasticity in the *volume* of funds needed to finance business through its fluctuations of prosperity and depression. To the rather fixed and steady supply of *primary* credit furnished by member banks

of the system is added this buffer of *secondary* credit which can be increased or decreased as the need arises for conserving sound values and for keeping liquid the whole supply.

Though the principles and methods are comparatively simple the difficul-

ties of putting them into practice are tremendously complicated and involved, and the controversial question of bank and credit policies constantly tests the experience and sagacity of the keenest minds engaged in solving financial problems.



# The Effects of Instalment Selling on Stability

By WILBUR C. PLUMMER

Assistant Professor of Economics, Wharton School of Finance and Commerce,  
University of Pennsylvania

WHAT are the effects of instalment selling on the stabilization of industry? Does it tend to equalize production throughout the year in the individual plant, or does it tend to increase seasonal fluctuations? In the long run, that is, over a period of years, will it be a force tending to increase the ups and downs of business which constitute what is known as the business cycle, or will it tend to stabilize business, causing production, prices and employment to fluctuate less in the future than they have in the past? There are certain phases of these questions which can be answered somewhat definitely, and we shall attempt to answer them in this article. In large part, however, questions regarding the actual effects of instalment buying on the stabilization of business cannot be answered definitely. There are many influences affecting the individual industry and business as a whole, and up to the present time no attempt has been made inductively to segregate the special influence of instalment buying and thus find out its actual effects. Some of the questions are speculative in nature. This is true particularly in regard to instalment selling as a contributing cause of future business crises, panics and depressions. The problem is one which does not admit of positive proof and opinion is divided on the subject.

## EQUALIZED PRODUCTION IN THE AUTOMOBILE INDUSTRY

One of the effects of instalment selling has been the bringing into the pres-

ent system of production a new institution known as the finance company. The function of the finance company is to supply funds to dealers to buy cars from the manufacturers and to extend credit to individual purchasers of cars bought on the instalment plan. The development of the finance company has had the important economic effect of making possible steady production in an industry, the demand for the product of which is seasonal in character. The volume of sales of automobiles in the beginning of the industry was subject to extreme seasonal fluctuations.<sup>1</sup> Due to the increased use of closed cars, the development of the instalment system and possibly other contributing factors, the seasonal fluctuations were greatly reduced.

It became evident early in the development of the automobile industry that if the manufacturing plant was to be run at its maximum efficiency, it would be necessary for production to be equal and continuous the year round. Expensive machinery lying idle part of the time increases unit costs. The importance of steady production in a business with large overhead expenses cannot be overstated. Steady production means lower costs to the manufacturer and in the automobile business has meant lower prices to the consumer.

The industry was confronted with

<sup>1</sup> See chart by Prescott, P. B., showing changes in seasonal variations in production of passenger cars, 1910-23, in *Problem of Business Forecasting*, Persons, W. N., Foster, W. I., and Hettinger, A. J., p. 105.

the difficult problem of how to secure steady production to meet a seasonal demand. The manufacturer needed his own capital as well as what he could borrow for manufacturing purposes. Besides, he could not carry his entire output over the winter months for other than financial reasons. He did not have the storage space, and even if he could have provided such space the problem would not have been solved. Cars should be distributed geographically, when the spring demand arises, for transportation reasons. The dealer could not take the cars off the manufacturer's hands, because he did not have funds of his own and could not secure them from the regular banks for this purpose. It was the development of the instalment system that helped to solve the problem. The finance company extended credit to the dealer, permitting him to lay in his stock as it was finished at the factory. The manufacturer was paid in cash. Production was continuous. Transportation was more easily effected as it was spread over a longer time and the spring rush was lessened. The dealer was able to show his stock on his sales floor and have it ready for immediate delivery to meet the seasonal demand. It was in such manner as we have just outlined, that the instalment system is credited with having helped to bring about a more stabilized output, and thus a more efficient and orderly procedure in the manufacture, transportation and sale of automobiles.

#### EFFECTS OF INSTALMENT CREDIT ON THE BUSINESS CYCLE

The causes of the business cycle are somewhat a matter of controversy, but probably most of those who have given the matter thought, would agree that credit conditions are an important consideration, particularly in the period of prosperity and in the precipita-

tion of the crisis. "Credit conditions" as a cause of crises and depressions has heretofore meant *producers'* credit, but on account of the extension of the instalment system, consumers' credit is a new force that is being considered as a possible factor in causing future ups and downs of business. Within the last two or three years, it has been freely predicted that instalment selling will cause the next crisis and depression. One forecast said that "A distinct recession in business and possibly a panic within two or three years would not be surprising. . . . It will be the result of overextension of the instalment business, which today is eating into the vitals of business like a cancer."<sup>2</sup> The exact way in which instalment buying will bring on the next business recession and possible panic is not explained in connection with this prediction, so it is not possible for us to examine the facts and reasoning upon which this specific conclusion is based.

A particular way in which credit has operated heretofore to influence business conditions is through its effect on the general level of prices, which in turn, has affected production. The truth has long been established through deductive reasoning and verified to some extent by inductive study<sup>3</sup> that an increase in the volume of credit relative to goods produced will tend to cause a rise in the general level of prices or a fall in its reciprocal, the value of the dollar. It is also an orthodox view that a rising price level temporarily stimulates trade, bringing on prosperity and a business boom. However, when the entire stock of material equipment of industry and the

<sup>2</sup> Babson, R. W., *The New York Times*, September 12, 1926.

<sup>3</sup> See Working, Holbrook, *Quarterly Journal of Economics*, February, 1923, pp. 228 ff.; also see *The Review of Economic Statistics*, July 1926, pp. 120 ff.

available supply of labor are being utilized to their fullest extent, further extensions of credit cannot increase appreciably the total output of goods.<sup>4</sup> The increased credit simply increases the monetary purchasing power, by an increase in bank deposits, which is used in competitive bidding for services and other economic goods, already in existence. An illustration of this point may be found in the marked and unhealthy advance in the price of wool in 1919. It is said that this could not have occurred if Boston and other banks had not granted unusual credits to wool dealers. With these funds wool dealers competed against each other for wool, boosting prices to abnormally high levels with consequences painful to themselves and hardly to the permanent advantage of the wool grower. A similar situation obtained throughout the entire industry among makers of woollens and worsteds and among clothiers. All were attempting to handle more business, but the credit secured for the purpose was absorbed in a sellers' market for materials and labor, yielding still higher prices rather than an increased output. As for wholesalers and retailers, the summer of 1920 disclosed holdings of large stocks purchased at high prices, and in very many instances obligations under contracts for abnormally large deliveries in later months. These unhealthy conditions were due to the excessive volume of credit granted by the banks.<sup>5</sup>

<sup>4</sup> See Veblen, Thorstein, *The Theory of Business Enterprise*, pp. 92 ff.; Sprague, O. M. W., "Bank Management and the Business Cycle," *Harvard Business Review*, Vol. 1, No. 1 (1922), p. 22; *Business Cycles and Unemployment*, Report and Recommendations of a Committee of the President's Conference on Unemployment, pp. xxv, 26 (Adams, T. S.).

<sup>5</sup> Sprague, O. M. W., "Bank Management and the Business Cycle," *Harvard Business Review*, Vol. 1 (1922), p. 22.

The point we are attempting to bring out is that the constantly increasing volume of producers' credit which accompanies the period of prosperity and business boom after a time does not bring about a commensurate increase in production, but simply raises the general average of prices, which brings about undesirable economic consequences. The rising price level, making great profits possible, provides an incentive for enlarging the individual business, and results in competitive bidding of business men for the supply of labor, which is already fully employed, and for the available supply of materials, which is already in existence. The borrowers bid up the prices of services and commodities, and so cause an expansion in the pecuniary volume of trade. However, they produce no corresponding increase in the physical volume of trade. Their borrowings merely increase still more the mass of debts which upon the slightest occasion leads to demands for liquidation and precipitates a crisis.

#### INSTALMENT CREDIT AND PROSPERITY

It is common practice when an instalment sale is made for the purchaser to give his personal note to the retailer which is discounted with a bank either directly or through the medium of a finance company. Regardless of who discounts the notes, the proceeds are usually taken in bank deposits, which make it possible for the retailer or finance company to finance more instalment sales, which give rise to more instalment notes, which may in turn be used as a basis for another loan and another increase in bank deposits. In this way instalment sales result largely in an exchange of personal credit for bank credit. It would seem for this reason that the effect of an increase of instalment credit would be precisely

the same as that of other bank credit as far as the business cycle is concerned. It would seem that an expansion of instalment credit in a period of depression, if sales are thereby stimulated, would be a very desirable procedure from the point of view of the business cycle. Control of credit expansion so that production is increased to what is regarded as a proper degree, is a principle accepted as sound by all bankers. However, it is also an accepted principle of bankers that credit expansion should be checked when it becomes dangerous. To expand instalment credit in a period of business boom would seem to have precisely the same effect upon price levels, production and overexpansion of credit as the expansion of producers' credit would have. Additional pecuniary purchasing power in the form of bank deposits is created, while a corresponding increase in goods produced is not possible, due to the fact, as stated before, that in a period of intense business boom the industrial army with its full equipment is already at work. The increasing of instalment credit in a period of business boom would, therefore, like the increasing of producers' credit in such a time, help toward the piling up of debts, a condition known as overexpansion of credit which paves the way for crisis, liquidation and depression.

#### INSTALMENT SELLING AND OVERPRODUCTION

It is the belief of some persons that the long run effects of instalment selling upon the stabilization of industry will be distinctly adverse ones because it encourages overproduction. Messrs. W. T. Foster and Waddill Catchings, widely known writers on economic subjects, hold this view. Their position is set forth in connection with a somewhat original and highly controversial

thesis that "In a period of increasing productivity, industry turns out more consumers' goods than consumers can buy with their incomes." The resulting condition termed by them overproduction or underconsumption is given as a cause of business depression. Instalment buying is a logical outgrowth of this condition, according to these writers, because it enables production and apparent prosperity to be continued for the time being, even though the consumers do not have the purchasing power to pay for the goods, which they are buying. Instalment buying is thus a device which is causing greater overproduction than would have occurred without it and will cause thereby greater fluctuations in business.

A number of economists have condemned the position of Messrs. Foster and Catchings on the ground that it is simply the old fallacious idea that general overproduction is the cause of business cycles stated in a somewhat different form. The authors reply to these critics that it is admitted all goods cannot be overproduced in relation to each other and that if nothing but goods is considered the idea of overproduction does seem absurd. But if, on the other hand, one considers all that may happen to the medium of exchange, it is seen at once that there may readily be a general overproduction of goods in relation to the money which consumers offer in exchange for goods. It is their point that every business depression is marked by that kind of overproduction and that instalment selling during the last few years has been making greater overproduction possible.

#### MISDIRECTED PRODUCTION

While the proposition that instalment selling is a cause of general overproduction and consequently a cause



of fluctuations in business, is unsound, or at least, highly controversial, there is no question that instalment selling might quite possibly cause misdirected production and consequently cause instability. By misdirected production, or overproduction as some prefer to call it, is meant the building up of a productive capacity and the turning out of a finished product so great in relation to the demand that it will be necessary to sell the amount produced at loss. Everyone agrees that the automobile business has been built up to its present position as one of our greatest industries largely through the instalment system; also that the maintenance of its position depends almost entirely upon the continuance of the system. Automobile manufacturers and others who venture opinions on the subject say that if automobiles were sold for cash only, the sales would amount to possibly only 35 per cent of the present volume. The industry has been expanding rapidly, due in a large part to the instalment system, and if the leaders of the industry should for any reason whatever misjudge the future demand, the automobile plants would have to restrict output or close down altogether. The danger in such a situation lies in the fact that if the motor business should collapse in any way, it may and probably would be followed by a collapse in some of the industries dependent upon the motor industry, and from these it would spread to industry generally.

#### INSTALMENT BUYING AND PERIODS OF DEPRESSION AND RECOVERY

There are grounds for believing that the next period of depression will be prolonged on account of the instalment selling of the present. The reasoning is that heretofore when the crisis and depression came, there were huge stocks of goods in the hands of retailers,

wholesalers and manufacturers, which had been produced under high cost conditions, and there was no hope of recovery from the depression until these goods were bought. Since millions of people were unemployed, there was little buying and the larger the accumulated stocks in the warehouses, the longer the period until these stocks were sold. In the next depression, in addition to the merchandise in the hands of the producers which cannot be sold, there may be large quantities of repossessed goods, and still other huge quantities of goods in the hands of the consumers which will not be paid for. When the period of recovery comes the instalment buyers will be making back payments, plus accumulated service charges including interest, which will have mounted sky high as time passed, instead of buying new goods. The flexible clauses in the instalment contracts will, without question, permit the additional charges. But in addition to the difficulty of back payments, the stocks of goods, including the repossessed goods, must be sold before recovery can come, and this set of circumstances will cause recovery to be delayed longer than otherwise would have been the case if there had been no instalment system. There is no way of knowing what will actually happen, but this view of the situation seems a reasonable one.

On the other hand, there is the possibility that new extensions of credit will be granted in the latter part of the depression period, which will stimulate sales and hasten recovery. In other words, instalment selling may be the very device for hastening prosperity and lifting industry out of depression, just as it is believed to have done in a number of lines of trade, particularly the automobile business in the depression of the latter part of 1920 and the year 1921. In fact, it seems logical to

believe that if instalment selling were expanded in a period of depression, thereby increasing sales and encouraging production, it could be looked upon as a most useful agency from the standpoint of the business cycle. It would certainly seem, from the viewpoint of lessening the fluctuations of business, that the desirable procedure would be to expand instalment credit in a period of depression and restrict it in a period of prosperity and business boom. This, of course, is easier said than done, as keen competition existing between banks, between finance companies, between manufacturers, and between dealers in different kinds of goods, as well as the same kinds of goods, makes the restricting of instalment credit in a period of prosperity very difficult. Wide publicity has been given to the broadsides delivered at instalment buying by several prominent individuals, automobile manufacturers and bankers, who are indirectly engaged in the practice themselves on an extensive scale. "It is being overdone," "It has gone too far," they say, and one wonders if they, in their respective business units,

are decreasing the volumes of instalment sales. The instalment business has been, and is at the present time extremely profitable for these groups of business men, and which of them will put his foot on his instalment business and see it go to his competitor? For the exercise of control over the expansion and contraction of credit, one looks to the banking system—the banks as individual institutions as well as the Federal Reserve System. If the Federal Reserve Banks are able to control the general credit situation, as they are trying to do, and if they are wise enough to know the time or condition at which further extensions of credit should be discontinued in a period of prosperity, it would seem that instalment selling under such control might be a most useful device for lessening the extreme fluctuations of business. However, there is no getting away from the fact that instalment credit, like the older forms of credit, is a potentially dangerous phenomenon which without control will tend to help cause crises, panics and depressions, just as the older forms of credit have done heretofore.

## Relation of Commodity Prices to the Price Level

By AMOS E. TAYLOR

Assistant Professor of Finance, Wharton School of Finance and Commerce, University of Pennsylvania

THE most intricate processes of economic life center in what we understand as the price system. Within this system values are determined, wealth is transferred, and goods and services are evaluated in terms of human effort and application. Any forces which perchance operate to upset the relative orderliness of these economic processes enshroud our efforts of today in a maze of uncertainty with regard to the morrow. We seek to exchange the greater part of our productive application for the things which others, through creative endeavor or other means of acquisition, are able and willing to offer us. In order to keep commodities moving along the channels of exchange we have developed a highly organized and specialized credit system from whose fountain head pours forth the means whereby our exchanges of goods and services are effected. In the development of this system we have attempted to keep pace with the agencies of invention and industrial technique, with the result that its sensitive threads transmit stimuli to the bases of all forms of economic activity.

The price system comprises all the elements in our economic experience identified with and related to prices of commodities, services, capital, credit, land, etc. All these are knitted together into a closely integrated arrangement. Forces concentrating their energies along any of the strands in this intricate system tend to be carried along to different points, sometimes creating new sets of forces, always giv-

ing rise to long-continued oscillations. Only when these various forces have dissipated their respective energies is there an approach to a condition of stability. The delicacy of the price mechanism at once suggests a need for elements of control which shall be applied by those who have a full understanding of its many parts and of their relation to each other. It is essential that the separate parts be isolated and that their relation to the whole system be carefully appraised.

The relationship between individual prices and the general price level, represents a distinction which must be clearly understood by every one who would aim at a comprehension of the influence which commodity prices bring to bear upon the general level of prices. In mathematical expression the price level appears as a relative, as a measure of the purchasing power of the monetary unit, in terms of which price quotations are stated. The price level is a dynamic composite determined by cumulative forces of the past and indicative of future trend. It is measured by an index number which represents the present point of a continuous trend.

The sensitivity of the general price mechanism is reflected in the changes in price relationships which emanate from all markets where buyer and seller are brought together. The measure of the forces determining these price relations represents, like the waves on disturbed waters, a series of oscillations about the general level—a level which is a common multiple of

individual prices as well as a mathematical average of their total weight. The general price level is the line about which price relations seek definite expression.

#### EFFECTS OF CHANGING FACTORS ON PRICES

The movements of individual commodity prices are affected by certain constantly changing factors which are independent of the principal elements in the price system. In certain lines of production in which weather conditions and the forces of nature account for an unexpected surplus or shortage of goods far-reaching alterations in price relations may result. Changes in the quantity of money in circulation, as well as changes in methods of manufacture and distribution, are influences making at times for instability. The factors of supply and demand pertaining to each good or service are not only different, but they vary as between different markets. Again, goods in passing from the raw material state to that of highly-specialized finished product, pass through various processes each one of which is identified with particular price-determining factors. These varying lines of individual price activity form an integrated system. The separate parts must be approached through the system as a general measure.

The cumulative forces of these various factors frequently account for a great rapidity in the rate of price change, thus tending to disperse individual prices over a wide field. As price changes become representative of an increasing degree of variability their frequencies tend to increase correspondingly. Due to the varying degrees of change in individual commodity prices, from one date to another, their increased dispersion gives further emphasis to the disturbance in price relations. Because the factors

underlying individual price changes do not spend their energy at the same rate and in the same direction, the relative position of commodity prices during a period of disturbance is indicative of increasing displacement.

Stabilization of prices means stabilization of the price level. Whatever controlling influences can be safely brought to bear upon individual prices, arise out of a control of the general price level. A sudden rise in the price level at once reduces the purchasing power of those who have fixed money incomes. Incomes, no matter how derived, are part and parcel of the price system. If a sudden disturbance causes the price of what one has to sell to fall, while that which he has to buy rises in price, a disruption of price relations is inevitable. One can no longer measure his purchasing power with any degree of accuracy. Just as the pebble thrown into a calm body of water disturbs the surface equally in all directions, so the price disturbance makes itself felt in time along the whole line of the price level. The farmer whose products have to be placed on the market at declining prices, while the prices of shoes and clothing rise or remain the same, is compelled to pass a diminishing amount of purchasing power to the manufacturer.

The effect of this process will in time be reflected in a decrease of purchasing power somewhere else. The forces behind such a disturbance disseminate their energies in every direction. If the disturbance breaks out at many points simultaneously, price relationships may be so completely upset that the channels of exchange will become entirely clogged up. Business went through this kind of experience after the World War, and the current interest in stabilization is largely prompted by the lessons of the immediate post-war period.



## EVIDENCES OF INFLATION AND DEFLATION

Price stabilization connotes price relativity. The zenith and nadir of instability are the respective extremes of inflation and deflation. Neither is an antidote for the other. Evidences of inflation manifest themselves as soon as short-time credits fail to be supported by goods, potential or real, sufficient to liquidate the obligations created. It is, of course, difficult to tell just at what point inflationary measures obtrude themselves. Inflation has no absolute measure. In the emission of government paper currency, it may at once be reflected in the discount at which the paper exchanges for the standard monetary unit. Our interest here lies in the fact that inflation disturbs the price level and violently jars the existing price relations. Rising prices stimulate business by increasing profits—in some cases much more than in others. Rising prices are not necessarily indicative of inflation, but a stable price level is strong evidence that inflation does not exist.

Whatever accentuation of business activity arises during the upward price movement is suggestive of the degree of future inactivity. The business experiences of the early post-war period have amply demonstrated that sudden shifts in the price level, no matter in what direction, impart such a terrific shock to commodity prices that normal price relationships are completely shattered. The oscillatory movements continue while the amplitude of price swings remains a wide one for a long time. In the meantime business is speculative, uncertain, and sporadic. Due to the lessons of deflation experienced during 1920-22, manufacturers and merchants have in more recent years been more or less afraid to buy

ahead. The appearance of scarcity in 1919 proved false. At the time it was not as clear as it was later that the tremendous demand for commodities was simply the result of universal speculation in contracts. It required a period of liquidation to disclose the nature of the forces underlying price trends at the end of the war.

The enormity of price disturbances during a cycle of inflation and deflation tends to raise difficult price problems for certain types of business. Price deviations become exceedingly pronounced and the industry, whose product is at the low extreme, may face ruin. In February, 1922, the index of tobacco prices was 325 on the basis of 100 for 1913 prices. At the same time the rubber price index stood at 18. Anthracite coal was well over 200, but tin, zinc, coffee and copper stood at extremely low points. The experience of those industries, whose products fall to extremely low price levels, frequently invites them to undertake "stabilization" experiments. Whatever the scheme, it necessarily resolves itself into a more or less arbitrary interference with those external factors, discussed above, which are independent of the price system. Valorization is substituted for the free operation of the forces of supply and demand which determine individual prices. Some of these schemes provide for some degree of flexibility in the adjustment of price schedules. Nevertheless, in any arbitrary measure of price maintenance there lies hidden the idea of valorization. Experience has shown that such methods of control serve only a transitory purpose and tend to disturb other elements of the price system. The long-time ineffectiveness of valorization is again indicative of the workings of certain inexorable economic laws which underlie commodity price movements.

## PRICE VARIABILITY

In entering upon a discussion of internal price relations one becomes immediately indebted to Dr. Frederick C. Mills for his recent contribution to a hitherto neglected field.<sup>1</sup> His analysis of price behavior during the ten more or less distinct cycles from 1890 to 1925, not only indicates that each phase of the cycle is tied to the preceding phase by definite bonds, but also that there is, an apparent synchronization between the degree of fluctuation of specific commodity prices and the course of the cyclical trend. During the pre-war years there was a steady decline in the variability of commodity prices, as well as in the frequency of price changes. There was a close correlation between their lines of trend and the degree of variability. Those commodities which showed the steepest trends tended to be more variable in price than those with less pronounced trends. The war period completely changed this course of price variability. Price frequency appeared on a higher scale and price trends became relatively sharper. The extent of the disturbance can be measured particularly by the course taken by the commodities immediately in great demand. Commodities whose prices rise first during the upward trend generally fluctuate more widely than do the prices of commodities which lag during the early "prosperity" period.

In a period of revival the forces behind individual prices operate with various degrees of momentum, with the result, that during a rapid rise in business activity, there becomes manifest an increasing variability and a wide scattering of prices. The order of price rise tends to deviate from the sequence which is present during recession. The order of revival exercises a smaller

degree of influence upon the order of succeeding recession than the order of price recession, in a given cycle, exerts upon the succeeding revival.

Changes in the general price level appear to move concurrently with the cyclical changes in business. Whatever degree of disturbance of business is evident is measured by corresponding fluctuations in the price level. In other words, there is a tendency for internal price disturbances, to vary directly with changes in the general price level. "If we assume that the causal relationship runs from changes in the price level to variations in the degree of internal disturbance, the evidence of the present study indicates that, during the years 1893-1926, approximately 40 per cent of the internal instability of wholesale prices could be attributed to fluctuations in the wholesale price level. The remaining 60 per cent may, on this evidence, be attributed to other causes which would, presumably, continue to operate if there were no changes in the level of prices."<sup>2</sup>

Instability is synonymous with changes in price which affect the relations between the various elements of the price system. When a set of price relationships is disturbed, the relative position in the economic system of producers and consumers is upset, and recipients of money incomes are affected to a corresponding degree. The disturbance of internal price relationships shifts the point where buying and selling relations have been established. These changes in established price relations are the means whereby an unstable price level expresses itself throughout the economic system. Once the disturbance takes place it causes the forces operating within the price system to cut across each other's lines, accentuating a movement here, checking one there. Instability in the price

<sup>1</sup> "The Behavior of Prices." National Bureau of Economic Research. Publication No. 11, 1927.

<sup>2</sup> *Ibid.*, p. 369.

level alters the lines of individual price relations, largely because the separate forces, which, singly or in combination, influence the trend of the price level, affect the elements in the price system neither at the same time nor in the same degree.

#### DISTURBING INFLUENCES

An examination of the general factors which influence the movements of the price level, the trend of individual prices, and the various price relations, suggests very clearly the significance of the factor of credit. Stabilization of the price level really means the stabilization of the credit situation. There are long-time trends in business movements which influence the demand for credit as well as the direction of the price level. Seasonal factors constantly exert a strong influence. Stability quite properly permits the price level to rise sufficiently after harvest time, so as to allow orderly movement of the crops. Various industries have their seasonal demands for credit, and these seasonal influences tend to reflect themselves in the price level. Stabilization should aim at removing the uncertainties which confront the seller when he attempts to translate his supply of goods into a form of purchasing power which he can employ in any market. Whenever a price rise takes place, which can not be explained by normal factors, there arises the spectre, of an excessive peak, price relations will become greatly agitated, and the demand for credit assumes abnormal proportions. Elements of speculation creep into the business processes and inflationary tendencies suggest themselves at various points.

There are forces of a less general nature constantly threatening price agitation. The frequent interference with economic forces on the part of political factors tends to inject artificial influ-

ences no less disturbing than measures of price valorization. A tariff policy leading to continuous gold imports may so enable our banks to assume a position of independence, that credit control by the federal reserve banks is made difficult. Such a condition is always pregnant with possibilities of periodic booms and collapses. The probability of a decline in foreign loans after a few years may have adverse effects upon credit control, if at the same time, the payments due for interest and amortization increase at a uniform rate.

Nature has the habit of subjecting certain types of business to unusual risks which frequently develop into dominant price factors. Weather conditions may account for unexpectedly large crops which will affect railway earnings and the demand for the products of other industries. Inventive genius changes—sometimes very abruptly—the lines of competitive effort with results which soon manifest themselves in price aberrations.

#### CONTROL OF CREDIT BY FEDERAL RESERVE BANKS

Since the early part of 1923 when the federal reserve banks formally declared that it is one of their main functions to stabilize the general credit situation—meaning the price level—the general price index was never permitted to wander far from the normal trend line without being pulled back. Apparently reserve bank control has been effective although somewhat arbitrary means were employed in the control exercised through open-market operations. A study of commodity price trends, during recent years, shows that every advance in the rediscount rate of the federal reserve bank of New York was followed by weakness in commodity prices. Inasmuch as open-market operations tend to foreshadow

changes in the rediscount rates one can say that the reserve bank holdings of government securities are directly related to commodity price movements. The decline in the price level during the first half of 1923 came in the wake of a reduction in federal reserve holdings of government securities which began in January of that year. Following the upward movement in security holdings at the beginning of the following year, commodity prices began to move upward during the early part of summer. When in the fall of 1924 the reserve banks reduced their security holdings, a price decline set in during the early part of the following year. In May, 1927, security holdings increased, and the index of commodity prices began to rise a month later.

Before the war, central banking policy generally guided its credit mechanism in the light of gold movements. Credit operations were more or less subject to the theory whereunder the flow of gold into a country tends to raise prices, thus reducing exports and increasing imports. The eventual outflow of gold in settlement of the import balance would tend to restore equilibrium. In accordance with this principle those countries constantly adding to their respective gold supplies experience a corresponding rise in prices. But it must be remembered that business disturbances in the pre-war period were not due to the universal rise in the price level; they were due rather to the violent fluctuations about the trend line.

#### PRICE LEVEL ANALYSIS

An analysis of the price level since 1923 shows a fair degree of regularity. Yet it is doubtful whether the trend of the index number of wholesale prices is an accurate measure of the effectiveness of federal reserve credit policy. The constant inflow of gold eventually

gave the member banks a degree of independence not consonant with the effective control of credit by the reserve banks. The objects of credit control are so to raise or depress price movements as to prevent cumulative influences from breaking the line of general price trend. Beginning with 1923 the Federal Reserve Board accepted control of the price level as one of the major purposes of the reserve system. The banks at once undertook to do by means of open-market sales and purchases what they could not do through the medium of the rediscount rate. The significance of recent federal reserve operations may easily be overestimated in a consideration of commodity price trends. It is quite probable that the recent rise in rediscount rates will exert little influence on commodity prices.

The fact that the most marked and most aggressive price variations accompany a sharply rising price level, or a rapidly falling one, would indicate that if we could remove the cause of these sharp changes in the general level, we could thereby neutralize the deviations from the average shown by individual prices. Professor Fisher's plan for stabilizing the dollar by changing the gold content of the dollar in accordance with changes in the price level, assumes that changes in the price level are not only concurrent with changes in the degree of business stability, but that they are the causal factor behind the shifts in values and the business disturbances, identified with the cyclical movements. It is, however, not clear that the "dancing dollar" is the chief causal factor underlying the movement of the general price level. Theoretically sound the stabilized dollar would hardly *by itself* eliminate the influence of the other factors. It might be an important step in the direction of stability. But



it is important to remember that it is not only the *value* of the dollar which determines the conditions of exchange in the markets, but it is rather the *use* to which it is put that is important. Certainly its use influences the credit situation and in turn the price level. At any rate we are dealing with a credit system still based on a monetary standard of fixed gold content.

The significance of recent federal reserve banking policy lies not simply in the fact that prices have been kept from rising during a period of what really represents an upward trend in the business cycle. The elements of stability introduced have possibly not yet fully revealed themselves. The elimination of wide price fluctuations, during a period when gold was literally flooding the country, has been partly the cause, partly the result, of the removal of certain other factors of instability. The increasing habit of hand-to-mouth buying has released working capital formerly tied up more or less indefinitely. Manufacturers have been forced to take accurate measure of the wholesale and retail markets in order that they may meet the needs of buyers from month to month. The new competition has compelled business enterprises to overhaul their accounting systems, to cut out waste and excessive costs, and to introduce carefully formulated plans for the operations of the coming turnover period. Budgetary control has been instrumental in conserving credit needs, and at the same time it has lessened credit risks. The fact that our industrial and commercial structure has been well equipped to produce and deliver goods in large quantity, with rapidity of movement, has considerably aided the banks in their credit policies. Speculation in inventories and price manipulation arise only when industrial capacity is forced to the limit and faced

with an ever-increasing demand for future delivery which can not be met.

Probably the most difficult problem in the formulation of credit policy is that of determining the proper time for changes in the rediscount rates. It is always possible that a credit policy, strongly influenced by the security markets, may cause a slight break in the trend of the price level with repercussions, which are felt in the prices of individual commodities and their price relationships. It is significant, however, that the relative stability of the commodity price level since 1923 has been accompanied by a gradual decline in price variations. The unusual situation in agriculture since the deflation of 1920-22 is, of course, still characterized by independent price movements among agricultural groups. The contrast between the movements of agricultural prices, and prices of non-agricultural products, was particularly striking during 1927. During the first half of the year there was a considerable decline in the prices of non-agricultural commodities, after which they remained more or less steady. Agricultural products showed little change early in the year and then rose steadily from June to October. While the prices of certain commodities are still out of line with others, these variations appear to be due either to factors of production—particularly in some agricultural lines—to which it is difficult for credit policy to adjust itself, or they are changes largely determined by seasonal and cyclical influences.

The credit policy of the federal reserve banks has contributed much to minimize the breaks of commodity prices. This control has been exerted through the control and maintenance of a relatively stable price level. At the same time, it must be remembered that our credit system is not an auto-

matic device wound up periodically by measured forces under absolute human control. There is reason to believe that commodity price movements may be upward even though rediscount rates are again raised. With the diversion of funds away from the security markets there is some evidence of slight speculation in commodities. It is not certain that the price declines,

which have followed reserve rate reduction since 1923, were entirely influenced by reserve bank action. The cause of one may often be the effect of the other. Moreover, the fact that commodity prices in the leading European countries are beginning to fluctuate within increasingly narrow limits is not without its stabilizing influences in this country.



PUBLIC CONSTRUCTION  
*and*  
CYCLICAL UNEMPLOYMENT

By  
F. G. DICKINSON, PH.D.  
*University of Illinois*



BEING THE SUPPLEMENT TO  
*The Annals*  
OF THE  
AMERICAN ACADEMY OF  
POLITICAL AND SOCIAL SCIENCE



THE HISTORY OF THE  
CITY OF BOSTON  
FROM 1630 TO 1800

BY  
JOHN H. COLEMAN

1871

BOSTON  
PUBLISHED BY  
J. B. LEECH

100 NASSAU ST. N. Y.

THE HISTORY OF THE CITY OF BOSTON FROM 1630 TO 1800

## FOREWORD

PROFESSOR W. H. BEVERIDGE<sup>1</sup> in the course of his lectures to Oxford students some eighteen years ago gave three main criticisms of the proposal to provide through State employment a reservoir of labor for industrial fluctuations. He pointed out that such employment would inevitably become to a very large extent relief employment, upon which the men would be paid wages in excess of their earnings; it would in practice prove impossible to make any system of State employment act as a reservoir for the ordinary labor market; to set up a reservoir of labor at the public cost is simply to perpetuate industrial disorganization.

Some later students of this great problem of unemployment have been more optimistic about the possibilities of public works as a preventative measure. Perhaps the most distinguished of these advocates of the use of public construction has been Arthur L. Bowley,<sup>2</sup> the British statistician and economist.

Contemporary interest in the subject in the United States has been evidenced in various ways. Early in 1919 Senator Kenyon of Iowa introduced a bill in the United States Senate designed to enlarge the public construction program during periods of depression.<sup>3</sup> Certain states have statutes or executive policies which are in line with the Kenyon bill.<sup>4</sup>

Furthermore, the general belief that the present (1926-27) era of great prosperity must terminate sometime in a more or less severe depression prepares the way for public interest in this proposed method of preventing acute business depression.

The purpose of this study is to obtain a measurement of the possible maximum power of public construction to prevent cyclical unemployment. It is not intended that the chief result of this investigation shall be argument in favor of or against the use of public works in this manner. The measurement of its possibilities may, however, shed some light on that issue.

An attempt will be made to answer the following questions, and the ones which they suggest, for the period studied:

1. What were the annual expenditures for various types of public construction?

2. What were the changes in unemployment?

3. If this public construction had been perfectly allocated in the years of greatest unemployment, approximately what portion of the unemployment would it have absorbed?

4. How would this shift in public construction have affected the cost of construction and the cost of floating the government indebtedness?

5. What are the practical economic and political obstacles which would have to be surmounted in the operation of this preventive measure?

Although the chief responsibility for reducing and preventing unemployment lies upon the shoulders of private management—as most work is carried on by private industry—public officials are not without their share of the re-

<sup>1</sup> Beveridge, W. H., *Unemployment—A Problem of Industry*, 1909, pp. 195-6.

<sup>2</sup> Bowley, A. L., *Is Unemployment Inevitable?* 1924, Part IV.

<sup>3</sup> Hearing before Senate Committee on Education and Labor, Feb. 7, 1919, p. 75 *et seq.*, on S-5397 introduced Jan. 21, 1919.

<sup>4</sup> National Bureau of Economic Research, *Business Cycles and Unemployment*, pp. 253-4, 1925.

sponsibility. City officials are under special obligations to keep their own workers continuously employed. By helping to reduce general unemployment they may lessen the need of providing public relief measures.

The serious-minded public official will naturally ask, "What can be done?" Perhaps a few "captains of industry," who are inclined to take humanitarian views, will try to fathom the mystery of industrial depressions and unemployment. Industry itself must eventually solve the problem of its ebb and flow of employment. But under the present competitive system it does not seem feasible to expect groups of employers to take measures which will insure continuity of income to workers. Although a number of industrial establishments have inaugurated plans for stabilizing employment among their own employees,<sup>5</sup> the vast majority of enterprises have accomplished little toward that end. Since effective measures to regularize employment have not been generally adopted by private employers, the possibility of reducing unemployment by properly distributing public works is worth studying.

The problem of utilizing public construction in this way is threefold. It is fiscal in that the necessity for public officials to reduce the cost of construction and of floating indebtedness so as to use the taxpayers' money to the best advantage must be considered. It is civic since it must be recognized that the need for improvements and buildings demands that construction must take place at certain times for public convenience regardless of the quantity of employment. Lastly, the labor problems must be considered. What are the wage losses suffered by labor-

ers? How does unemployment affect their efficiency and morale? Is the wage loss alone greater than the fiscal loss that might result from constructing public works before costs have fallen to their lowest level?

The original intention was to include in this study all the wage-earners in the United States. Largely because of the scarcity of employment data concerning other than manufacturing industries, it has become necessary to limit the scope of this inquiry to wage-earners engaged in manufacturing. This limitation is not, however, as serious as it might seem. The data available indicate that the most serious difficulties are encountered among these groups of employees. Manufacturing industries suffer more frequent and more severe fluctuations in activity than do other employments. Therefore, the elimination of extreme fluctuations in manufacturing is the most important single step in stabilizing employment.

There are more wage-earners in manufacturing industries than in any other group of industries. According to one investigation<sup>6</sup> the average number of employees on the payrolls of all enterprises in the United States was about twenty-eight millions in 1920 and twenty-four and eight tenths millions in 1921. For these same two years the numbers of employees in manufacturing industries were 11 and 8.7 millions respectively. That is, the number of employees in the manufacturing industries comprised 39 per cent and 31 per cent of the total respectively. This is more than three times as great a percentage as the next largest group-transportation industries.

It is necessary to decide upon the

<sup>5</sup> For an excellent discussion of these plans see Feldman, H., *Regularization of Employment*, 1925.

<sup>6</sup> King, W. I., *Employment Hours and Earnings in Prosperity and Depression, 1920-22*, p. 30, 1923.

best time-period to study. To include all or a portion of the war period, with its distortion of public and private construction, would deprive this study of its possible usefulness in peace times. During the World War the productive energy of the nation was diverted to war industries; public officials were devoting their attention to winning the war rather than to the building of hard roads, new courthouses, waterworks, and other things. The data on unemployment and construction are scanty enough since the close of the World War and they are almost nonexistent for the period prior to 1914. Therefore, the period of 1919-25 has been selected.

Manifestly, there are disadvantages

involved in using a short space of seven years. The conclusions reached must be cautiously stated because of the brevity of the observation period. These seven years have witnessed a stupendous expansion in public construction accompanied by great increases in municipal and state indebtedness. This unique feature of the period is partly offset by other conditions discussed in Chapter III.

In order to get the best results it would be necessary to consider a complete business cycle, using the peak of prosperity as the starting point. The years 1919-25 may prove to be a complete cycle—only the course of business within the next half-dozen years can determine.





## TABLE OF CONTENTS

	PAGE
FOREWORD.....	iii
CHAPTER	
I. THE VOLUME OF PUBLIC CONSTRUCTION.....	175
II. FLUCTUATIONS IN EMPLOYMENT, PAYROLL TOTALS, AND THE ANNUAL FACTORY WAGES.....	178
III. CONSTRUCTION COSTS AND INTEREST RATES ON MUNICIPAL BONDS...	186
IV. ASSEMBLY AND INTERPRETATION OF DATA.....	188
V. PRACTICAL OBSTACLES.....	199
VI. SUMMARY AND CONCLUSIONS.....	206

ta  
T  
F  
It  
la  
ar  
ty  
ite  
bu  
po  
m  
je  
ir

an  
co  
Th  
lin  
no  
dic  
On  
Ch  
wo  
tin  
inc  
bec  
fur  
the  
six  
bor  
beg

por  
cer  
tiv  
the  
bui  
of  
cou

Stat

# The Volume of Public Construction

## CHAPTER I

**T**HERE are four distinct methods of approach to the problem of obtaining data on public construction. The first and least reliable source is the *Financial Statistics of States and Cities*. It presents items under the term, *Outlays*. The weaknesses of these data are several. They do not itemize the types of construction; non-construction items appear; purchase of land and old buildings constitute a considerable portion of the total. Furthermore, the method of gathering the data is objectionable in that it is somewhat irregular.

A second method is to consider the amount of bonds sold by municipal, county, and state governments.<sup>1</sup> There are several obvious defects in this line of approach. Bonds are issued for non-construction purposes such as soldiers' bonuses and refunding debts. On the other hand, some cities (*e.g.* Chicago and New York) finance public works out of receipts from taxes. The time lag may make bond sales a poor index of contemporary construction, because a considerable portion of the funds may be expended months after the bonds have been sold. Frequently six to nine months elapse after the bond sale before actual construction begins.

The third method is to use the reports of building permits issued in certain representative cities. The activity of the construction industry in these cities, as indicated by permits to build, may or may not be good samples of the trend throughout the whole country. In some cities a permit is

not required of a contractor on a public works job. When a person gets a building permit he is asked only for an estimate of what he expects the project will cost. The actual figure may vary greatly from the amount specified in the building permit. Furthermore, it is a permit and not a contract to build. The citizen is not compelled to build at any certain time.

There remains a fourth source of data which is free from some of the defects of the others. There are several agencies which make a business of gathering, assembling, classifying, and interpreting data on the number and price of contracts actually let. They secure this information regularly from public officials, architects' offices, and contractors in the building industry. The data are published weekly and, in some cases, information may be obtained daily.

This source of data has several strong points to recommend it. It includes only the net cost of the construction items. For our purpose this is the only cost which will indicate a fund for wage-earners. Since they appear on the date the contract is let, the time lag is partly eliminated. Of course wages will be paid long after the contract is let. This source of error might be eliminated by allowing for an average time to complete the project. This would, however, involve the use of weekly or monthly data—a stupendous task and one far beyond the limits of this inquiry.

On the other hand, there are cities and counties, particularly in the southern states, which play the rôle of contractor by hiring the labor, buying the

<sup>1</sup> Mallery, Otto T., U. S. Bureau of Labor Statistics, No. 311, p. 76.



building supplies, and directing the project. Technically these are not "Contracts let," but the two agencies (which are mentioned below) try to include them in their computation. It is sometimes difficult to place an exact money value on this type of construction.

These private agencies are moved by a profit incentive to make these data on construction volume complete, up-to-date, and accurate. They cannot sell their building news service unless it possesses these characteristics.

For these reasons, the data on public construction are taken from the reports of these agencies. There are several available, but the two outstanding agencies are the F. W. Dodge Corporation and the *Engineering News-Record* (McGraw-Hill publication).

#### REPORT OF F. W. DODGE CORPORATION

In the years 1919-23 the former agency reported all types of building and construction in twenty-seven Eastern states. Since 1923 nine states have been added, bringing the total up to thirty-six.<sup>2</sup> Mr. Thomas S. Holden, the statistician for the F. W. Dodge Corporation, has made an estimate of the total annual construction activity for the entire Continental United States for each of the years of our period. His statement of the method employed is as follows:

These estimates are believed to be more nearly representative of what actually happened in the earlier years of the period covered than previous estimates have been. Estimates previously published have been made on the assumption that the per capita construction throughout the country was

<sup>2</sup> The nine states referred to are: Oklahoma, Arkansas, Louisiana, Mississippi, Alabama, Florida, Georgia, Kansas, and Nebraska. The twelve states not among the thirty-six are: Washington, Idaho, Oregon, Wyoming, Utah, Nevada, California, Arizona, New Mexico, Colorado, Montana, and Texas.

the same as in the territories covered by the Dodge statistics. While this assumption would be very nearly correct over a period of years, it may be quite misleading when applied to a particular year. Thorough analysis of available data on all territories has been used in making the above estimates. In the earlier years of the period the southern and western territories, which were not covered by Dodge statistics, had small construction volumes in proportion to the rest of the country; and building activity in those sections has increased very rapidly during the time covered by the table. The figures of the table assume complete coverage by the Dodge statistics within their own territory, no more comprehensive building statistics than the Dodge figures being available.<sup>3</sup>

There is no fixed ratio between the data for the twenty-seven states and the estimate for the entire country. It is assumed that the proportion of public to private is the same in the revised estimates for the entire United States as for the estimates for the parts of the country.

Local architects and contractors have been questioned about the efficiency of the F. W. Dodge representative in this territory. All of these people claim that there are few contracts let that the local representative does not include in his reports. In fact, one firm of contractors<sup>4</sup> intimated that the local Dodge man was so persistent in his inquiries as to be almost a nuisance.

The *Engineering News-Record* data have a different and somewhat narrower scope, although they cover the entire United States. This agency specializes on engineering construction contracts and does not include residential building (which comprise from 30 to 45 per cent of the Dodge totals). Furthermore, only large contracts are

<sup>3</sup> *The Architectural Record*, reprinted from the January, 1926, issue, p. 87.

<sup>4</sup> English Bros., Champaign, Ill.

TABLE I—ESTIMATE FOR ENTIRE U. S.

Annual Construction, 1919-25  
(Millions)

A	B	C	D
Year	Total Construction	Public Construction	Wages (80% of C)
1919.....	\$3,143	\$674	\$539
1920.....	3,337	852	681
1921.....	3,068	859	687
1922.....	4,329	1,034	826
1923.....	4,768	1,022	818
1924.....	5,237	1,111	888
1925.....	6,600	1,283	1,026
Totals.....	\$30,482	\$6,835	\$5,465

supposed to be included. The minimum costs observed are: \$15,000 for waterworks and excavations; \$25,000 for other public works; \$40,000 for industrial and \$150,000 for commercial buildings.<sup>5</sup> Although most of the engineering construction probably exceeds these minimum cost levels, some projects must be omitted from the figures.

#### REPORT OF ENGINEERING NEWS-RECORD

It is evident that the reports of the F. W. Dodge Corporation<sup>6</sup> are much more complete for this study than those of the *Engineering News-Record*. It is entirely possible that the latter source might give a reasonably accurate index of relative changes in the volume of public construction from year to year; but it is necessary to use totals in this study rather than the percentages of fluctuation.

How can the public items be separated from the private? Since April,

<sup>5</sup> *Engineering News-Record*, March 18, 1926, p. 468.

<sup>6</sup> *The Commerce Year Book* of the United States Department of Commerce quotes the Dodge figures as well as those of the *Engineering News-Record*.

1923, the *Engineering News-Record* has listed the public items separate from the private.<sup>7</sup> The Dodge reports have never separated the two kinds. Mr. Thomas S. Holden assisted in making a separation into public and private by compiling unpublished data giving the annual totals for each of the numerous private items which appear in the Dodge classification called, "Public Works and Utilities." He also made an estimate of the distribution of the classes called, "Educational Buildings and Hospitals and Institutions" between public and private items. This cooperation made it possible to prepare estimates for public construction separated from private, as shown in Table I.

Since April, 1923, the *Engineering News-Record* has separated the private from the public construction items. In 1924 it reported the total public construction to be \$964,517,000 as compared with \$1,037,252,000 in 1925. Because only large contracts are included, this estimate is far below our estimate and the per cent of in-

<sup>7</sup> Public construction refers to all construction the contract for which is let by a governmental board or official.

crease is 7.6 per cent as compared with a 15.6 per cent change in our estimates.

The next step is to determine the amount of employment given by a unit of construction. Investigation has not unearthed any studies which bear directly upon this point. Mr. Arthur L. Bowley<sup>8</sup> has assumed that 80 per cent of the construction cost goes into the pockets of wage-earners; but this is for English industry. Mr. Otto T. Mallery, contributing to the volume "Business Cycles and Unemployment" (the publication of which was authorized by the President's Conference on Unemployment), puts the percentage at 90. These estimates refer not only to wages paid to local labor but to the employees of cement mills, railroads, steel mills, and other plants furnishing building materials.

<sup>8</sup> Bowley, A. L., *Is Unemployment Inevitable?* p. 356.

According to one writer<sup>9</sup> 150 million dollars of every 200 million dollars spent for road construction went to wage earners directly employed on the work or upon the materials used in construction.

In the absence of specific information, it is necessary to select some figure. The foregoing discussion indicates that the choice should be between 75 and 90 per cent, a low figure being preferred because it would be better not to overestimate. If one year is taken as the time unit it is reasonable to assume that 80 per cent is not too high.<sup>10</sup> The accuracy of our conclusions will be affected by the wisdom of this selection.

<sup>9</sup> Pennybacker, J. E., *Public Works*, A 140, Vol. 52, No. 8, Feb. 25, 1922.

<sup>10</sup> This figure of 80 per cent is further substantiated by correspondence with various building contractors, especially certain prominent officials of the Associated Building Contractors of Illinois.

## CHAPTER II

### FLUCTUATIONS IN EMPLOYMENT, PAYROLL TOTALS, AND THE ANNUAL FACTORY WAGES

The impossibility of measuring unemployment directly has become widely recognized in the studies of the last few years. Instead of trying to estimate the number of persons unemployed, the attempt has been to get an adequate index of changes in employment. There have been, however, two agencies which have gathered data on unemployment. Since 1908 the Commonwealth of Massachusetts has collected data on unemployment among trade unions of the state. Somewhat similar data were published by the New York Department of Labor from 1897-1915.

The percentage of wage-earners who are members of trade unions is much

smaller in the United States than in England; hence trade union unemployment figures are not likely to be as indicative of our employment situation as would be the case in England.<sup>1</sup> Furthermore, the New York figures have not been collected since 1915 and cannot be used in our study.

There exist several sets of data on employment in manufacturing industries. The annual census of manufactures of Massachusetts has collected monthly payroll figures since 1886. The desire to improve upon this method led to some important changes in 1922.

<sup>1</sup> Bowley, Arthur L., *Is Unemployment Inevitable?* p. 367.

Under the former method the information was secured only once a year, whereas now it is gathered monthly. Moreover, the results are now published within a few days after being received. Under the census plan the figures were not available until some months after the end of each year. Since September, 1922, this manufacturing index of employment has been reliable and up-to-date. But our period began three years prior to the adoption of this new method, and therefore we cannot make use of it even if there were no other disqualification.

#### STATE FACTORY EMPLOYMENT STATISTICS

As a result of the recommendations of the Mayor's Committee on Unemployment in New York City of 1915, the New York State Department of Labor began collecting statistics of factory employment and has continued and improved the service. This monthly survey gives both the number of persons employed and the earnings. Factory employments in that state are fairly representative of the conditions throughout the whole country. All of the large manufacturing industries are well represented. The industrial composition of the index overemphasizes metals, giving them more weight than the United States Census of Manufacturers would permit. The monthly (and later weekly) data are gathered by methods approved quite generally, and appear to be accurate.

In 1915 state factory employment statistics were gathered by the Industrial Commission of Wisconsin at quarterly intervals. In 1920 employers carrying their own insurance under the Workmen's Compensation Act were required to report monthly the number of employees.<sup>2</sup>

<sup>2</sup> National Bureau of Economic Research, *Business Cycles and Unemployment*, p. 346.

Since January, 1922, a successful attempt has been made to cover all the industries of the state.

Following the great wave of unemployment of 1921 several other states have inaugurated similar series, notably Illinois, Iowa, and Connecticut. The United States Employment Service also began a series in January, 1921.

The United States Bureau of Labor Statistics began collecting data from manufacturing concerns in October, 1915. During the first year it included only cotton, cotton-finishing, hosiery, boots, and shoes. The scope of the statistics broadened rapidly and by the time of the depression of 1921 the survey included thirteen manufacturing industries, employing 500,000 wage-earners in 700 establishments. Further expansion followed with 9,436 establishments reporting in December, 1925; this included 2,891,724 wage-earners in fifty-three industries. These reports give the amount of payroll as well as the total number of persons who worked the whole or any part of the payroll period.

Before selecting one of these several indices it might be well to consider the requirements of a good employment index.<sup>3</sup>

1. It should be reported at frequent intervals and with accuracy.

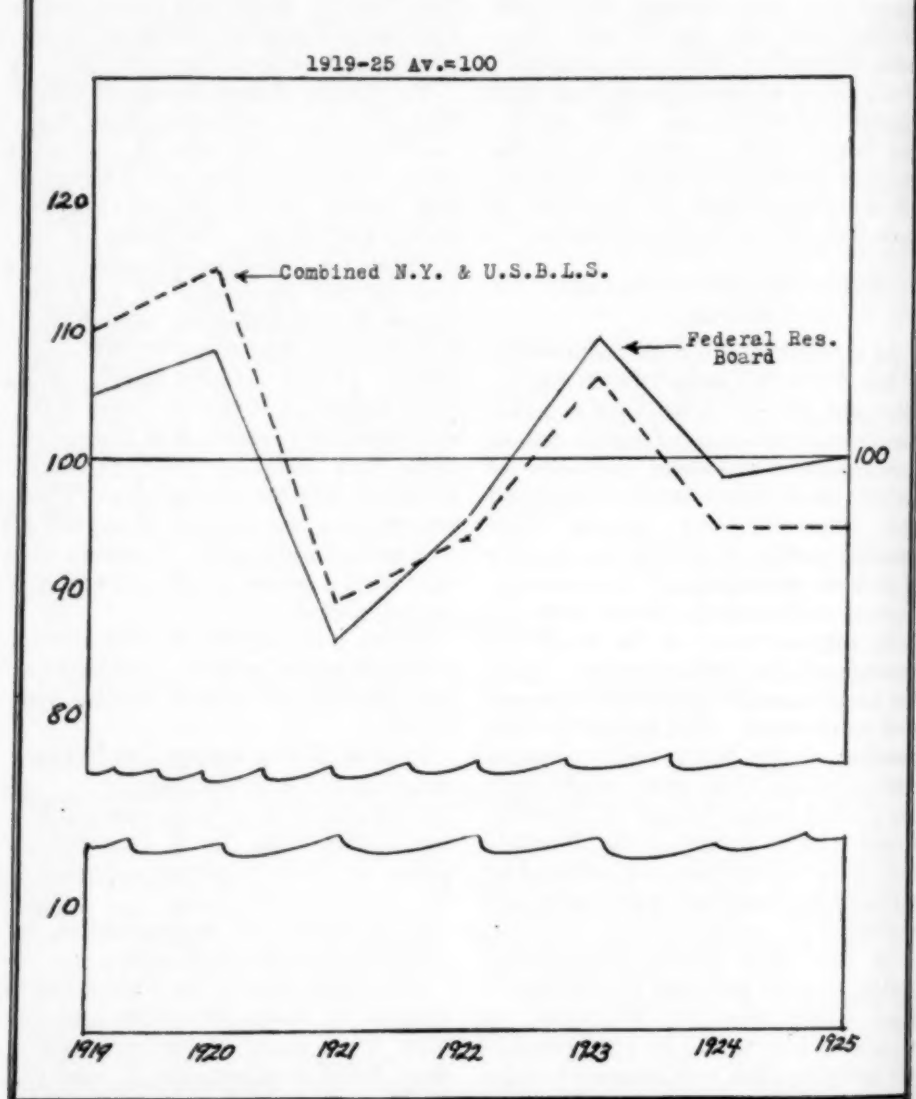
2. It should have been reported in a comparable form for a considerable period in order to permit appraisal of the results and methods.

3. It should be representative industrially and geographically.

Only the indices of the United States Bureau of Labor Statistics and the New York index of factory employment fulfill requirements (1) and (2). Neither one alone meets the third requirement. The former gives too much weight to textiles and the latter

<sup>3</sup> Berridge, W. A., *Cycles of Unemployment*, p. 43.

Graph I  
Trend of Factory Employment in the United States  
(Table II)



stresses metals too heavily. By combining the two this overemphasis is considerably lessened. Table II shows the results of this combination, giving

also the index of employment calculated by the Federal Reserve Board. The results are compared in Graph I.



TABLE II—FACTORY EMPLOYMENT INDEX

1919-25 Average = 100

Year	New York State	U. S. Bureau of Labor Statistics	Combined *	Federal Reserve Board Index †
1919.....	108	112	110	105
1920.....	113	114	114	108
1921.....	88	89	88	86
1922.....	95	92	93	95
1923.....	105	104	105	108
1924.....	96	94	95	99
1925.....	95	95	95	100

\* Arithmetical average of the indices of N. Y. and U. S. B. L. S.

† Federal Reserve Bulletin, Feb., 1926, p. 78. The base was changed from 1919 = 100.

## PRACTICAL DIFFICULTIES IN APPLICATION

The question naturally arises concerning the application of this index to non-manufacturing industries. Dr. Berridge<sup>4</sup> attempts to prove that this employment index can be used to indicate roughly fluctuations in all employments. He shows that this index compares favorably with the index of production calculated by Professor Edmund E. Day. In fact, the correlation coefficient (1919-21) is +0.96.

This high degree of correlation leaves

<sup>4</sup> *Cycles of Unemployment*, pp. 40, 45.

many questions unanswered. Does not the Day production index over-emphasize manufacturing industries in which the product of labor appears in a visible form? If this is true, it should agree with an index of manufacturing employment, and this correlation coefficient of 0.96 is not surprisingly high.

In further support of the contention that this index cannot be used to indicate fluctuations in employment, in non-manufacturing industries, the following data from Dr. King's study are given.<sup>5</sup>

This table substantiates the oft-

<sup>5</sup> King, W. I., *Employment, Hours and Earnings in Prosperity and Depression, 1920-22*, p. 30.

TABLE III—AN ESTIMATE FOR THE CONTINENTAL UNITED STATES OF THE AVERAGE NUMBER OF EMPLOYEES ON THE PAYROLLS OF ALL ENTERPRISES OF WHATEVER SIZE

Industries	1920	1921	1921 as a percentage of 1920
All industries.....	28,051,500	24,819,500	88.4%
Agriculture.....	1,816,250	1,762,000	97.01
Extraction of minerals.....	1,079,000	944,250	87.4
Building and construction.....	1,400,750	1,283,500	91.04
Other hand trades.....	560,250	568,000	101.3
Finance.....	396,250	383,250	96.7
Public and professional service.....	3,036,000	3,048,500	100.4
Domestic and personal.....	2,761,750	2,745,250	99.4
All transportation.....	3,296,000	2,843,250	86.2
Commerce and trade.....	2,606,000	2,534,000	97.2
All factories.....	11,090,000	8,707,250	79.1

repeated statement that manufacturing employment is more sensitive to the business cycle than other employment. Although 88.4 per cent of the wage-earners who were employed in all industries in 1920 were still on the job in 1921, only 79.1 per cent of the factory employees of 1920 were retained in 1921. The questionnaire method was used for both years, thus making the results comparable. Dr. King had less reliable data to interpret, but not sufficiently inferior to account for this difference in percentage.

It is mainly for these reasons that this study is limited to factory wage-earners and the possible benefits to be derived by them from the long-range planning of public construction. This limitation enhances the practical difficulties to be overcome in the actual adoption of this program.

#### INDEX OF PAYROLL TOTALS

An index of annual payroll totals for this period may be constructed in a similar manner. The New York and United States Departments of Labor

have compiled payroll data as well as figures for employment. The reasons for combining these two payroll indices are the same as those given for combining the two sets of employment data. In Table IV this combined index is given in Column D, and the index of the Federal Reserve Board in Column E. The data appear in graphical form in Graph II.

In comparing Columns D and E of Table IV, it is evident that the payroll index compiled by the Federal Reserve Board fluctuates more violently than the "combined" index. The former, however, has the following advantages, which seem to make it superior to the others:

1. The index of the Federal Reserve Board will presumably be continued, whereas the "combined" index is not published regularly. Future students will find this study more useful if an index is used which appears regularly.

2. More comprehensive data have been utilized in the computation of the Federal Reserve Board Index, espe-

TABLE IV—INDICES OF FACTORY PAYROLLS  
1919-25 Average = 100

A	B	C	D	E
Year	New York *	U. S. Bureau of Labor Statistics †	Combined ‡	Federal Reserve Board §
1919.....	96	108	102	97
1920.....	119	131	125	120
1921.....	85	83	84	81
1922.....	90	83	87	87
1923.....	108	104	106	110
1924.....	100	94	97	101
1925.....	102	97	99	104

\* *Industrial Bulletin* of the New York State Industrial Commission, Feb., 1926, p. 125. Base changed from 1914 = 100.

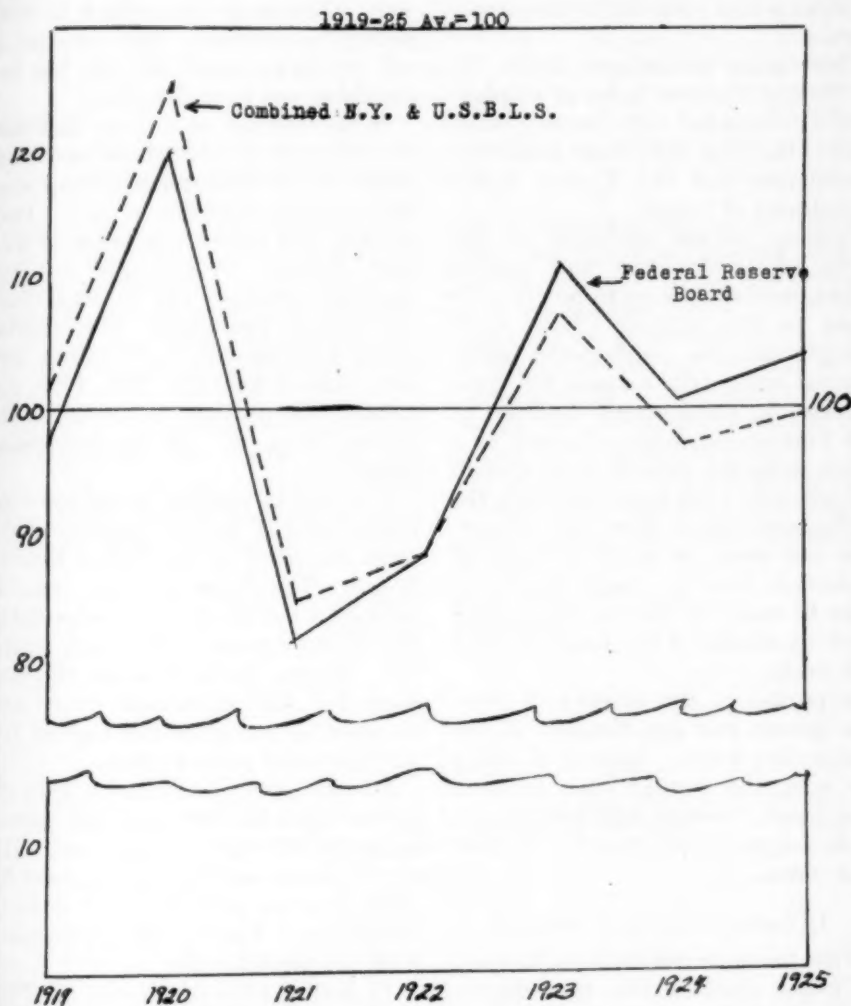
† *Monthly Labor Review*, Jan., 1926, p. 157. Base changed from 1923 = 100.

‡ Arithmetical average of the indices of N. Y. and U. S. Bureaus.

§ *Federal Reserve Bulletin*, Feb., 1926, p. 78. Base changed from 1919 = 100.

Graph II

Trend of Factory Payrolls in the United States  
(Table IV)



Base cially since 1923. The statisticians used data covering several states.<sup>6</sup>

<sup>6</sup> *Federal Reserve Bulletin*, May, 1925, pp. 325-7.

3. Better weighting is used. This "combined" index attempts in a rough way to counteract the improper weights used. But the Federal Reserve

Board's index attempts to weigh all data according to their relative importance as indicated in the census reports.

4. Also, this index conforms with the payroll and employment data of the biennial census of manufactures. This conformity leads one to believe that the index is also accurate for intercensal years.

These same advantages obtain for the Federal Reserve index of employment as compared with our combined index of the New York State Industrial Commission and the United States Department of Labor.

Turning to the question of the merits of employment and payroll indices, neither appears to be perfectly suited to this purpose. It is quite evident that the employment index does not accurately indicate the great decrease in employment because of part time employment. As long as a person is on the payroll, even though he works only a few hours per week, the employment index does not change. It is not sensitive to curtailment of production because many employers strive to maintain their working force intact by offering a few hours of work each week.

In prosperity the practice of overtime lessens the sensitiveness of the employment index. Instead of hiring new men, the regular force is given more hours, thereby increasing wages but having no effect upon the employment index.

#### EFFECTIVENESS OF INDICES

With these two objections in mind one might conclude that the employment index is far inferior to the other. Doubtless the payroll index does indicate better the ebb and flow of labor demand. But for this study it presents one weakness. The effects of fluctuations in the rate of wages are not re-

moved. It is the purpose of this study to attempt to measure the use of one method of lessening cyclical fluctuation in employment. The use of public construction in this fashion would tend to level up wage rates as well as the numbers employed. Hence the payroll index is less useful than it might seem. Inasmuch as neither is completely satisfactory, the conclusions will be drawn separately, for the employment and payroll indices.

If the Bureau of Census had continued to take an annual census of manufactures the total annual factory wage bill would be available to date. Prior to 1919 this census was taken at five-year intervals. A new policy has been adopted reducing the interval from five years to two years. In the period under consideration these census data are available for 1919, 1921, 1923, and 1925.<sup>7</sup> The problem is to estimate the factory wage bill for the intercensal years.

It would be possible to use the combined index of factory payrolls or the index compiled by the Federal Reserve Board. The latter is more desirable because it has already been adjusted to the census figures in the years available. Hence, Table V shows the estimate for the intercensal years constructed by means of the Federal Reserve index of payroll totals.

In making the estimate for 1920 the census data for 1921 and the payroll index for 1920 and 1921 are used. The census figure and the payroll index for 1919 vary too much from the series to be utilized. The trouble probably lies with the payroll index.

In getting the estimate for 1922 the census data of 1921 and 1923 are applied with the payroll index for these three years. The result obtained by working from 1921 is slightly more than that secured by working back-

<sup>7</sup> 1925 totals not yet available.

TABLE V—TOTAL ANNUAL FACTORY WAGES \*

Year	Factory Wages for Census Years (Millions)	Federal Reserve Payroll Index	Estimate for Intercensal Years (Millions)	Annual Factory Wages (Millions)
1919.....	\$10,461	97	.....	\$10,461
1920.....	.....	120	\$12,153	12,153
1921.....	8,202	81	.....	8,202
1922.....	.....	87	8,759	8,759
1923.....	11,009	110	.....	11,009
1924.....	.....	101	10,109	10,109
1925.....	.....	104	10,409	10,409
Total.....	.....	...	.....	\$71,102

\* U. S. Census of Manufactures, 1919, 1921, 1923.

wards from 1923. In that case the estimate for 1922 becomes an average of these two amounts. Since the 1925 census of manufactures has not been completed, the 1924 and 1925 figures are based upon the census totals for 1923 alone.

Dr. W. I. King made an estimate of the total factory wage bill for 1920 and 1921. The figure for 1921 is probably more nearly correct because the questionnaires were filled out in the latter

part of 1921 and 1922 and the data for 1920 were taken partly from memory. His estimate of \$11,676,000,000 covers both salaries and wages. The census data for 1921 give wages 76.2 per cent of the total for salaries and wages. Assuming this 76.2 per cent to be applicable to Dr. King's total, the wage bill would be \$8,896,000,000.

In Table VI are set forth estimates of the annual factory wages for this period, using the above-mentioned

TABLE VI—ESTIMATE OF ANNUAL FACTORY WAGES  
(Based on Dr. King's data)

Year	1919-25 Av. = 100			(Millions)	
	A	B	C *	D	E
	N. Y. Payroll Index	U. S. B. L. S. Payroll Index	Combined A and B	King's Estimate for Wages Only	Final Estimate of Annual Factory Wages
1919.....	96	108	102	.....	\$10,766
1920.....	119	131	125	.....	13,168
1921.....	85	83	84	\$8,896	8,896
1922.....	90	83	87	.....	9,076
1923.....	108	104	106	.....	11,210
1924.....	100	94	97	.....	10,135
1925.....	102	97	99	.....	10,494
Total.....	...	...	....	.....	\$73,745

\* Arithmetical average of "A" and "B."



figure for 1921 as the starting point. The estimate for the other years is based upon the combined factory payroll indices of New York and the United States Bureau of Labor Statistics as they fluctuated from the payroll indices of 1921.

It is interesting to compare the results of these two different methods. The total factory wages for the seven years are \$71,102,000,000 according to the first methods, whereas the second method gives \$73,745,000,000, a difference of 3.7 per cent. This small per cent of difference is rather unexpected after the methods are contrasted and compared. The two results seem to substantiate each other. The only large discrepancy appears in 1920, the amount being \$1,000,000,000, or about an 8 per cent variation. The two estimates differ by less than one-third of one per cent in 1924.

The first method is more desirable because the basis is not derived from an isolated study but from the regular reports of the Bureau of the Census—

reports which will be available for future years. Furthermore, the methods of collecting data employed by the census bureau's staff is superior to the questionnaire sample method. For these, and other minor reasons, the conclusions will be drawn with reference to the first estimate of the annual factory wage bill wherein census and Federal Reserve data and index are utilized.

It is desirable now to restate the problem. The factory employment indices fluctuated about 25 points during the period 1919-25. If the public construction of this seven-year period had been carried on in the years when the employment index was below 100, could it have been raised thereby up to 100? In other words, could this employment curve, which was uneven, have been flattened out into a straight line? This question cannot be answered until the fluctuations in construction costs are considered, because the data on the volume of public construction are in monetary terms rather than units of construction.

### CHAPTER III

#### CONSTRUCTION COSTS AND INTEREST RATES ON MUNICIPAL BONDS

The *Engineering News-Record* has calculated a cost index for construction work of all types. Such indices as those of the Aberthaw Construction Company apply to special kinds of construction. The *Engineering News-Record* Index is to be preferred because it attempts to indicate nation-wide fluctuations in construction cost. The method as described in their publication is as follows:

The *Engineering News-Record's* Construction Cost Index Number is a national index of general construction cost in the United States. For that reason, in its

computation only basic material and common labor are considered. Steel, cement, and lumber are the fundamental materials of the construction industry, and the rate paid common labor eventually determines the cost of labor.

The importance of the cost of brick, sand, gravel, crushed stone, and the rest is not minimized; but these materials are usually produced locally and their prices are subject to fluctuating local conditions.

The *Engineering News-Record* Construction Cost Index Number is not referred to Boston or Seattle, to Minneapolis or El Paso, but to the 3,507,540 square miles of the United States. Changes in towing rates on the Hudson River will affect the

price of brick or crushed stone, alongside dock, New York, without making any change whatever in the nation-wide cost of construction. On the other hand, a price movement in either steel, cement, or lumber wields an influence that is almost invariably continental in its scope.

The *Engineering News-Record* Construction Cost Index Number is the prices of steel, cement, lumber, and common labor in 1913. Furthermore, these materials and common labor are weighted according to their relative importance as adjudged by the *Engineering News-Record*. These weightings are: Steel 37.50 per cent; cement 7.40 per cent; lumber 17.10 per cent; labor 38 per cent. The weightings were determined by studying the annual production of the three prime materials and the number of common laborers (exclusive of farm labor) in the United States. The markets considered are structural steel in Pittsburgh, cement without bags f.o.b. Chicago, 3 x 12 x 12 southern pine to contractors in New York, and the average price of common labor in the eighteen to twenty cities listed in the *Engineering News-Record* in the first issue of each month. (These cities are Atlanta, Baltimore, Birmingham, Boston, Cincinnati, Chicago, Cleveland, Dallas, Denver, Detroit, Kansas City, Los Angeles, Minneapolis, Montreal, New Orleans, New York, Pittsburgh, St. Louis, San Francisco, Seattle, and Philadelphia.) The prices are those obtained in the last week of each month and published in the first issue of each month. The quantities of these materials and the number of man-hours used in computing the Index Number were selected so that the total cost (quantities multiplied by prices and added together) for 1913 would be \$100 for a "unit of construction."

For example, if the quantities are 25,000 pounds of structural steel, six barrels of cement, 600 feet b. m. of lumber, and 200 man-hours, and the prices are \$1.50 for 100 lbs. for shapes, 1.19 per ut. bbl. of lumber, and 19 cents per hour for common labor, the total computation will be \$99.74; 100 is the base *Engineering News-Record* Construction Cost Index Number.<sup>1</sup>

<sup>1</sup> *Engineering News-Record*, Jan. 4, 1923, p. 42.

This somewhat lengthy excerpt has been quoted to show clearly the method of computation. Local price-fixing forces cannot materially affect this index, which is truly national in scope. The weighting of labor and materials at 38 and 62 per cent compares favorably with weighting employed by Dr. Ernest S. Bradford<sup>2</sup> and by the New York Federal Reserve bank—40 per cent for labor and 60 per cent for building materials. Another strong argument in favor of the *Engineering News-Record* Index is that contractors, engineers, and architects frequently refer to it.

In Table VII this index of cost of construction is given using both the 1913 and the 1919-25 averages as the base.

TABLE VII—CONSTRUCTION COST INDEX \*

Year	1913 = 100	1919-25 Average = 100
1919.....	198.42	95.90
1920.....	251.28	120.31
1921.....	201.78	96.61
1922.....	174.45	83.53
1923.....	214.07	102.49
1924.....	215.36	103.12
1925.....	206.68	98.94

\* *Engineering News-Record*, Jan. 5, 1926.

In the concluding paragraphs of Chapter I it was stated that 80 per cent of the contract price went into the pockets of wage-earners during a year. This statement appears to conflict with the practice of the *Engineering News-Record* of weighting common labor 38 per cent in the calculation of their construction cost index. The two uses are quite different and in no way conflicting, because a large amount of the material cost (steel 37.50 per cent, cement 7.40 per cent, and lumber 17.10 per cent) is wages—an amount

<sup>2</sup> National Bureau of Economic Research, *Business Cycles and Unemployment*, p. 175.

which would have to be added to the 38 per cent to make a percentage comparable with the 80 per cent referred to in the above discussion.

In addition to the cost of actual construction the expense of financing public improvements has a bearing on the situation. The cost of construction might be low and thus encourage public officials to let contracts; but at the same time interest rates might be high and bond issues expensive to float. The problem of cost is, therefore, twofold.

The *Daily Bond Buyer* has assembled some data which are relevant, from which Table VIII, showing the net income, has been constructed.

This table indicates that 1921 was the most unfavorable year in which to float municipal bonds, as the Value Index (based upon net earnings) was highest in that year. Public officials wish to sell bonds when interest rates are low. This period witnessed the greatest flood of tax-exempt bonds in our national history. Low interest, caused partly by the desire of many to get tax-exempt incomes, and the reduction of public construction to a bare minimum during the busy days of the

TABLE VIII—NET INCOME AND ANNUAL VOLUME OF MUNICIPAL BONDS

Year	Net Income on Bonds of Twenty Large Cities *	Total Municipal Bonds Sold
1919.....	4.49%	\$770,195,248
1920.....	4.99	773,063,986
1921.....	5.08	1,383,368,900
1922.....	4.23	1,279,553,134
1923.....	4.24	1,135,167,124
1924.....	4.23	1,446,688,993
1925.....	4.13	1,390,621,780

\* The regular reports of the *Daily Bond Buyer* were not accessible. These figures were gained by correspondence with the editor.

World War, probably account for the plethora of securities of this type.

It should be remembered that considerable construction is financed from receipts of current taxes rather than bond issues. The city of Chicago has followed this plan for many years. Hence, any attempt to tie up bond issues with public construction would be futile. Under these conditions changes in the interest rate do not enter into the total cost of public improvements. Additional discussion of this point will be given in the next chapter.

## CHAPTER IV

### ASSEMBLY AND INTERPRETATION OF DATA

The next step is to bring together the data presented in the three previous chapters. The following sets of data are to be processed and interpreted:

1. Index of Factory Employment.
2. Index of Factory Payrolls.
3. Total Annual Factory Wages.
4. Total Public Construction.
5. Annual Construction Wage Fund.
6. Index of Cost of Construction.

The point for investigation is to discover the extent to which the variations in the index of factory employment and factory payrolls might have been lessened. Obviously, the only way this can be done is by increasing greatly the amount of public construction in the years when the employment index fell below 100—the average of the seven-year period. In Chapter II reasons were given for drawing con-

TABLE IX—FACTORY WAGES, EMPLOYMENT, AND REQUIRED INCREASE IN FACTORY WAGES IN BAD YEARS

Year	Factory Wages * (Millions)	Factory Employment Index † 1919-25 Av. = 100	Required Increase in Factory Wages ‡ (Millions)
1919 . . . . .	\$10,461	105	....
1920 . . . . .	12,153	108	....
1921 . . . . .	8,202	86	\$1,335
1922 . . . . .	8,759	94	559
1923 . . . . .	11,009	108	....
1924 . . . . .	10,109	99	94
1925 . . . . .	10,409	100	....
Total . . . . .	\$71,102	....	\$1,988

\* See Table V, p. 185.

† See Table II, p. 181.

‡ Required to increase employment to the average of the period, that is, to raise the factory index to 100.

clusions separately from the same data, using first the employment index and then the payroll index.

The employment index computed from the data of the Federal Reserve Board as given again in Table IX reveals that in the years 1919, 1920, and 1923 the index was 105, 108, and 108 respectively. The base 100 is the average of the seven-year period. The employment in manufacturing plants in the United States during these three years was above the average. These were the so-called good years. Surely there was no need to expand public construction during these years. In fact, it would have been desirable to have had fewer government contracts let during these prosperous years.

#### SHIFTING PUBLIC CONSTRUCTION

According to the employment index the lowest level was 86 in 1921. It rises to 94 in 1922, and to 99 in 1924, so near the average of the period that it does not warrant the attention which must be given to the years 1921 and 1922. Specifically, the problem is to shift public construction from

1919, 1920, and 1923 into 1921 and 1922 particularly, and into 1924 if possible.

How much should each of these good years give up and how much should each of the bad years receive? Since all of the data on public construction are in monetary terms, the fluctuations in the employment index must be given monetary magnitudes. The annual factory wages,<sup>1</sup> which are given in millions of dollars, may be utilized. In 1921 the census estimate for total factory wages was \$8,202,000,000; the index of factory employment for 1921 was 86, which is 14 points below the average of the period 1919-25. In order to express this fluctuation of 14 points in millions of dollars, it is assumed that an increase in the factory wages bill of  $1/86$  would raise the index

<sup>1</sup> The secular trend has not been removed from any of these data. A period of seven years is not long enough to determine secular trend accurately. Although there is a trend in all the data, a calculation for such a brief period might derive a trend totally different from what would be obtained from a longer time covering the same period. Hence, a possible error from this source is recognized.

TABLE X—ANNUAL PUBLIC CONSTRUCTION WITH TOTALS GOING TO WAGES BEFORE AND AFTER SHIFTING

Year	A	B	C	D	E
	Public Construction (Millions)	Construction Wage ** Fund (80% of Total) (Millions)	Best † Allo- cation of "B" (Millions)	Best Allo- cation of Public Construction (Millions)	Index of Em- ployment After Shifting Construction 1919-25 Av. = 100
1919.....	\$674 *	\$539	\$16 §	\$20	100
1920.....	852	682	20	25	100
1921.....	859	†	1,335	2,527	100
1922.....	1,034	†	559	1,732	100
1923.....	1,022	818	15	19	100
1924.....	1,111	†	94	1,229	100
1925.....	1,283	†		1,283	100
Total.....	\$6,835	\$2,039	\$2,039	\$6,835	....

\* *Ante*, Table V.\*\* *Ante*, p. 185.

† The figures for 1921, 1922, 1924 are irrelevant because in these years employment was below the average of the period and in 1925 the index was 100, the average of the period.

‡ Best in the sense of stabilizing employment.

§ Source of Construction Wages shifted.

1919 retains \$16 million of the total for 1919.

1920 retains 20 million of the total for 1920.

1921 obtains 523 million from 1919.

1921 obtains 662 million from 1920.

1921 obtains 150 million from 1923.

1922 obtains 559 million from 1923.

1923 retains 15 million of the total for 1923.

1924 obtains 94 million from 1923.

Total.. \$2,039 millions.

of employment one point,<sup>2</sup> to occasion a rise in the employment index from 86 to 100, an increase in the factory wage bill of  $\frac{14}{68}$  or approximately \$1,135,000,000. Additional public con-

<sup>2</sup> This method of translating changes in the employment index into factory wages creates a small error in the calculations because factory wages are a result of changes in the rate of wages as well as in the number of persons employed. Reasons have already been given for not using the payroll index exclusively. In 1921, an increase of \$95,000,000 in wages would have raised the index of employment one point (per cent) as compared with \$93,000,000 in 1922 and \$94,000,000 in 1924. This error is not sufficient to affect the conclusions.

struction would be required to furnish this billion dollar wage fund. It is estimated that 80 cents<sup>3</sup> of every dollar spent on construction goes into the pockets of wage-earners engaged on the job, transporting materials, or manufacturing the building materials.

The construction work available for shifting was performed in the three good years—1919, 1920, and 1923. It would be unwise to disturb the public construction of the three bad years, as shifting it would only aggravate the situation. The value of the public

<sup>3</sup> *Ante*, p. 14.



construction was \$674,000,000 in 1919, \$852,000,000 in 1920, \$859,000,000 in 1921, \$1,034,000,000 in 1922, and \$1,022,000,000 in 1923 (Table X). Using the 80 per cent estimate the wages would amount to \$539,000,000; \$682,000,000, and \$818,000,000 respectively. All of the \$539,000,000 of construction wages could not have been shifted out of 1919 without reducing employment in that year to less than the average (index of 100). If approximately \$523,000,000 of construction wages or 5 per cent could have been shifted out of 1919, the index of employment for that year would have been 100. The total shiftable wage fund furnished by the good years is approximately \$2,023,000,000, whereas the required increase in the bad years is \$1,988,000,000 (Table IX).

A tentative conclusion may now be stated. If the public construction of this seven-year period had been properly allocated, with reference to fluctuations in factory employment, the total amount of wages furnished thereby would have been sufficient to make up the deficiency in the factory wages as shown by the indices of the three bad years.

In Table X, Columns "B" and "C," the shifts in construction wages showing both origin (footnote) and destination are given. Column "A" gives the annual totals for public construction before shifting and Column "D" the totals after shifting. This shift in construction would have leveled the employment index to 100 for every year (Column "E").

The best allocation of construction has reference both to the paucity of employment and the number of years the work must be advanced or postponed. The shifting ought to be for as short a time interval as possible. The interval does not exceed one year except the shift from 1919 to 1921.

This fact is important as it would largely determine the practical value of any program of planning public construction so as to prevent cyclical unemployment.

But public construction cannot be shifted about from year to year like pawns in a game of chess, even though the shift be only for two years. This would also affect the practical value of any program. Civic convenience and necessity require that certain essential projects be completed in certain years. Sewers, lighting systems, additions and improvements in waterworks, some paving, bridges on important highways, and certain drainage projects are in this class. The extent of this immobility is frequently more dependent upon political inertia than civic necessity.

According to the *Engineering News-Record* the value of large contracts let for streets and roads exceeded two and one-third billion dollars for the years 1919-25.<sup>4</sup> To a large extent the necessity for improved roads, especially state highways, is not so urgent that two years' postponement would cause any real hardship.

Furthermore, almost two billion dollars were spent for educational buildings which are probably capable of being postponed for a twenty-four-month period. These two important items constituted approximately five-eighths of the total public construction. It would not seem unreasonable to assume for the purpose of this study that only as much as one-half of the public construction possessed no time mobility and had to be constructed in the year in which it was originally performed. There seems to be no way of making a reasonably accurate quantitative estimate of the per cent of public construction that might conveniently be postponed or advanced. This question will be given further

<sup>4</sup> *Engineering News-Record*, Jan. 3, 1924, p. 44.

TABLE XI—ESTIMATED EFFECT OF SHIFTING ONE-HALF OF THE PUBLIC CONSTRUCTION

Year	A	B	C	D	E
	Public Construction (Millions)	Construction Wage Fund (80% of Total) (Millions)	Best Allocation of "B" If Only ½ of "A" Can Be Shifted (Millions)	Best Allocation of "A" (Millions)	Index of Employment After Shift 1919-25 Av. = 100
1919 .....	\$674	\$539	\$270	\$338	103
1920 .....	682	682	341	426	104
1921 .....	859	*	891	1,972	95
1922 .....	1,034	*	128	1,194	95
1923 .....	1,022	818	409	511	104
1924 .....	1,111	*	....	1,111	99
1925 .....	1,283	*	....	1,283	100
Total .....	\$6,385	\$2,039	\$2,039	\$6,835	....

\* Only the figures for the good years are relevant because those are the amounts which should be shifted.

† Source of Construction Wages Shifted.

1919 retains \$270 million from the total for 1919.

1920 retains 341 million from the total for 1920.

1921 obtains 269 million from 1919.

1921 obtains 341 million from 1920.

1921 obtains 281 million from 1923.

1922 obtains 128 million from 1923.

1923 retains 409 million from the total for 1923.

Total . . \$2,039 million.

consideration in the next chapter in connection with the problems of taxation and municipal bonds. Since the question is one of opinion, 50 per cent will be used and conclusions will be based thereon.

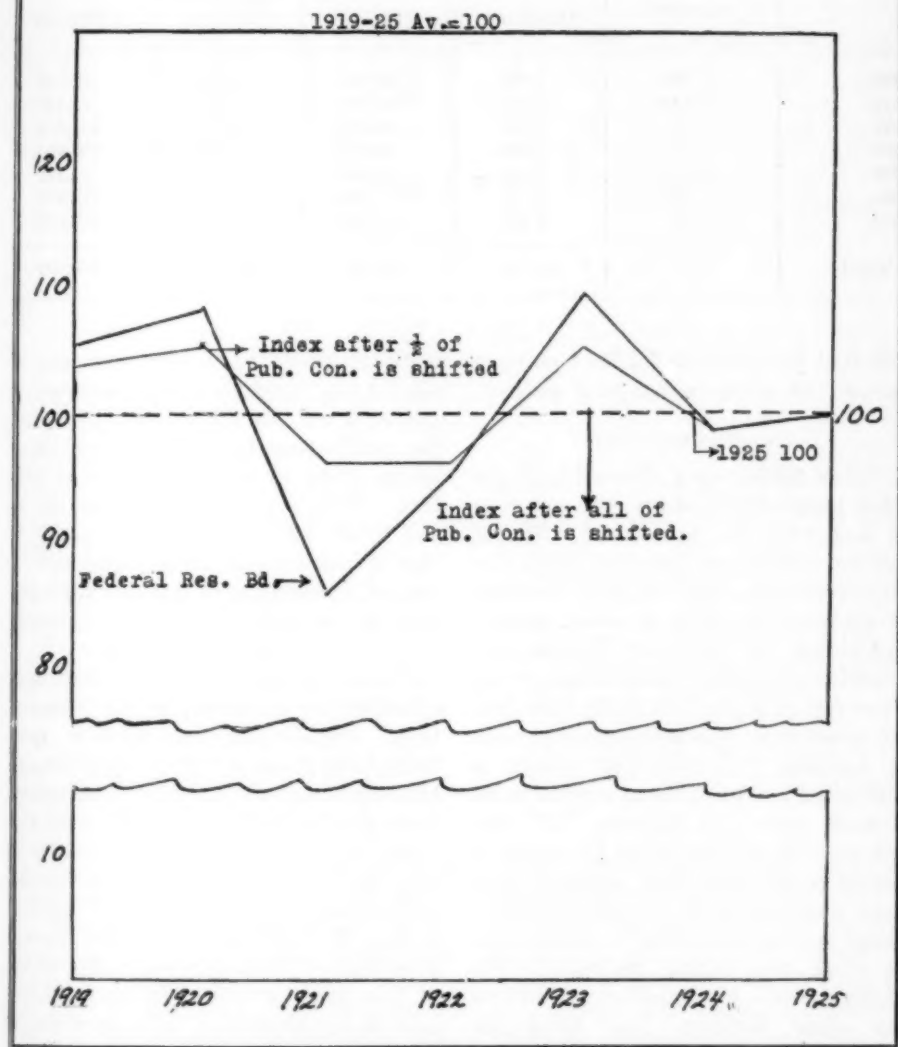
In Table XI, Column "A" gives the annual totals before shifting and Column "D" shows the best allocation of public construction, assuming that one-half has to remain in the year originally planned and the other half can be shifted backward or forward two years; likewise Columns "B" and "C" show the amount of the construction wage fund before and after shifting. Column "E" gives the reconstructed employment index after this shift has been made. A shifting of 50 per cent

of public construction is not sufficient to level the employment index to 100 for each year, as would be possible if 100 per cent could be shifted. The employment curve is still somewhat irregular, but not as much as was the old curve before the shift. The old index for 1921 was 86 as compared with 95 in the new. Likewise, the index for 1922 is raised from the old level of 94 to 95. No construction was shifted into 1924, as the index for the year was 99 and the need for increased employment was greater in 1921 and 1922. The change wrought in the employment index is shown in Graph III.

The year 1921 witnessed the greatest unemployment of the period 1919-25.

Graph III

Effects of Shifts in Public Construction upon  
Factory Employment.  
(Table XIII)



Assuming a 50 per cent shift, the conclusion is reached that  $\frac{95-86}{100-86} = \frac{9}{14}$ , approximately two-thirds of the unem-

ployment of that year would have been eliminated. The relief that this plan would have given to the unemployed in 1921 alone would probably have been

TABLE XII—ESTIMATED EFFECTS ON COST OF CONSTRUCTION OF SHIFTING ONE-HALF OF THE ANNUAL PUBLIC CONSTRUCTION

Year	A	B	C	D	E
	Construction Cost Index 1919-25 Av. = 100	Public Construction  (Millions)	"A"×"B"  (Millions)	Best Allo- cation of "B" After ½ Has Been Shifted (Millions)	"A"×"D"  (Millions)
1919.....	95	\$674	64,006	\$338	32,119
1920.....	120	852	102,240	426	51,120
1921.....	97	859	83,323	1,972	191,284
1922.....	84	1,034	86,856	1,194	100,296
1923.....	102	1,022	104,244	511	52,122
1924.....	103	1,111	114,433	1,111	114,433
1925.....	99	1,283	127,017	1,283	127,017
Total.....	.....	\$6,835	682,119	\$6,835	660,391

sufficient justification for its operation during the whole seven-year period.

#### EFFECTS ON COST

Before taking up a discussion of the other parts of this study, the question of cost must be considered. Would shifting public construction from the good years into the bad years increase or decrease the cost of construction? In Column "A" of Table XII the construction cost index <sup>5</sup> of the *Engineering News-Record* is reduced to the base 100, the average of the seven-year period. In Column "C" the cost index is multiplied by the value of contracts let in each year. In Column "E" the cost index is multiplied by the value of contracts let after the shifting took place, assuming a 50 per cent mobility. These two columns show a magnitude for each year which represents the relative costs of construction before and after shifting. The total for Column "E" is only 97.9 per cent of Column "C." This seems to indicate that this suggested redistribution of public construction during the years

<sup>5</sup> *Ante*, p. 34.

1919-25 would have been a means of saving the taxpayers approximately 2 per cent of the \$6,835,000,000 spent for public construction during these seven years, or about 140 million dollars. This is a very small amount of the total; but the important point is that this shifting of public construction cannot, in the light of this investigation thus far, be objected to on the grounds that it would increase taxation.

There are, however, three important questions to be raised in this connection. Would the construction cost index have remained unchanged despite this shifting of public construction from good to bad years? In 1921 the value of public construction contracts was 852 million dollars; this would have been increased to 1972 million dollars by shifting to combat unemployment. Without doubt the effect of this increase would be to raise the cost of construction. This increase in construction cost in 1921 might have eliminated the 140 million dollar saving. Although it is apparently impossible to make a quantitative estimate of the increase in cost, the forces

TABLE XIII—ESTIMATED EFFECTS OF SUGGESTED SHIFTS IN VOLUME OF CONSTRUCTION UPON FACTORY EMPLOYMENT, VOLUME OF CONSTRUCTION AND COSTS

Year	A	B	C	D	E	F	G	H
	Total Factory Wages (Millions)	Factory Employment Index 1919-25 Av. = 100	Required Increase in "A"	Total Public Construction (Millions)	Construction Wages (80% of "D") (Millions)	Best Allocation of "E"	Best Allocation of "D"	Effect of Shift on Employment 1919-25 Av. = 100
1919.....	\$10,461	105	....	\$6,674	\$539	\$16 †	\$20	100
1920.....	12,153	108	....	852	682	20	25	100
1921.....	8,202	86	\$1,335	859	*	1,335	2,527	100
1922.....	8,759	94	559	1,034	*	559	1,732	100
1923.....	11,009	108		1,022	818	15	19	100
1924.....	10,109	99	94	1,111	*	94	1,229	100
1925.....	10,409	100		1,283	*		1,283	100
Totals.....	\$71,102	...	\$1,988	\$6,835	\$2,039	\$2,039	\$6,835	...

Year	J	K	L	M	N	O
	Best Allocation of "E" If Only ½ Is Shifted (Millions)	Best Allocation of "D" If Only ½ Is Shifted (Millions)	Effect of ½ Shift Upon Employment 1919-25 Av. = 100	Construction Cost Index 1919-25 Av. = 100	"M"×"D" (Millions)	"M"×"K" (Millions)
1919.....	\$270 ‡	\$338	103	95	\$64,006	\$32,119
1920.....	341	426	104	120	102,240	51,120
1921.....	891	1,972	95	97	83,323	191,284
1922.....	128	1,104	95	84	86,856	100,296
1923.....	409	511	104	102	104,244	52,122
1924.....	....	1,111	99	103	114,433	114,433
1925.....	....	1,283	100	99	127,017	127,017
Totals.....	\$2,039	\$6,835	...	...	\$682,119	\$668,391

\* Only the good years had any surplus.

† Source of Construction Wages.

1919 retains \$16 million of the total for 1919.  
 1920 retains 20 million of the total for 1920.  
 1921 obtains 523 million from 1919.  
 1921 obtains 662 million from 1920.  
 1921 obtains 150 million from 1923.  
 1922 obtains 559 million from 1923.  
 1923 retains 15 million of the total for 1923.  
 1924 obtains 94 million from 1923.

‡ Source of Construction Wages.

1919 retains \$270 million of the total for 1919.  
 1920 retains 341 million of the total for 1920.  
 1921 obtains 269 million from 1919.  
 1921 obtains 341 million from 1920.  
 1921 obtains 281 million from 1923.  
 1922 obtains 128 million from 1923.  
 1923 retains 409 million of the total for 1923.

of supply and demand would indicate that some increase in cost would occur.

Nevertheless, the operation of the familiar economic forces might not eliminate the saving noted above. In fact, it might increase the amount. Surely, the opposite effect upon construction costs would have taken place in the years from which this public construction was withdrawn. In Table XI it is found that \$341,000,000 of

public construction would have been postponed from 1920 to 1921. If this increased construction cost in 1921, then the costs in 1920 should fall, though not necessarily in a corresponding degree. The total construction of all kinds and types amounted to more than three billion dollars in 1921, a volume large enough to partially stabilize cost despite the increases due to shifting from 1920. At any rate the



cost of construction would have been only slightly increased in 1921 and slightly decreased in 1920. Viewing the effect upon construction costs over the whole seven-year period, it would seem fair to conclude that the increases and decreases would roughly offset each other, thereby leaving the net saving practically undisturbed.

#### FINANCING PUBLIC CONSTRUCTION

The second question on cost has reference to the financing of public construction. First, it should be noted that considerable construction in large cities is paid for out of current tax receipts. Wherever that method of paying for public improvements is employed, this question of cost is irrelevant.

In Chapter IV mention was made of the fluctuations in the rate of interest yielded by municipal bonds. The highest average yield was 5.08 per cent in 1921. Although the investor desires a high rate the public treasury is benefited by a low rate. It appears that the year of greatest unemployment was, unfortunately, perhaps, the most unfavorable year for selling municipal bonds. A bond yielding \$5.08 would have sold for \$100 in 1921 as compared with \$101 in 1920 and \$115 in 1922. This would seem to indicate that public officials used wisdom in not trying to sell bonds for building purposes in 1921 and waited until the money market became easier the following year. The conclusion might be reached that the amount saved through lowered construction costs in 1921 was more than offset by increased costs of floating bond issues. This statement does not apply to works financed by current tax receipts.

This disadvantage of high interest rates in 1921 is somewhat misleading. There is a certain amount of necessary delay in letting contracts and beginning

work after the bonds have been sold. This interval is frequently six to nine months. It would seem that the bonds for summer construction in 1921 were sold in the late fall of the preceding year or, at the latest, in the early months of 1921. For this reason it is impossible to get an accurate estimate of the effect upon total cost created by fluctuations in the rate of interest upon municipal bonds.

#### SUMMARY

The conclusions reached thus far in this chapter have been based upon the index of factory employment. In the preceding chapter<sup>6</sup> reasons were advanced for drawing two sets of conclusions, based separately upon an index of employment and then upon an index of factory payrolls. In Table XIV the results of using the Federal Reserve Board's index of factory payrolls are given.

The index of factory payrolls fluctuates more violently than the index of employment, thereby making the condition of steady employment more difficult to secure. The high points of the employment curve are higher and the low points lower. This feature is due, in part, to the effects of changes in wage rates—a defect in the index for our purposes, as explained in Chapter II.

If all the public construction of this seven-year period had been perfectly allocated with reference to unemployment, as indicated by the index of payrolls, there would still have been considerable fluctuations in employment. The fluctuations would have been reduced and the curve smoothed out, but not sufficiently to eliminate all variations. This fact is indicated in Column "H," Table XIV, and in Graph IV.

If a shifting of 50 per cent of public construction is assumed the stabilizing effect is even further reduced as in-

<sup>6</sup> *Ante*, p. 26.

TABLE XIV—ESTIMATED EFFECTS OF SUGGESTED SHIFTS IN VOLUME OF CONSTRUCTION UPON FACTORY PAYROLLS, VOLUME OF CONSTRUCTION AND COSTS

Year	A Total Factory Wages (Millions)	B Factory Payroll Index 1919-25 Av. = 100	C Required Increase in "A" (Millions)	D Total Public Construc- tion (Millions)	E Construc- tion Wages (80% of "D") (Millions)	F Best Allocation of "E" (Millions)	G Best Allocation of "D" (Millions)	H Effect of Shift on Payroll Index 1919-25 Av. = 100
1919.....	\$10,461	97	\$325	\$674	*	.....	\$674	97
1920.....	12,153	120	.....	852	\$682	.....	.....	113
1921.....	8,202	81	1,924	859	*	\$1,306 †	2,482	94
1922.....	8,759	87	1,311	1,034	*	711	1,933	94
1923.....	11,009	110	.....	1,022	818	.....	.....	102
1924.....	10,109	101	.....	1,111	888**	.....	984	100
1925.....	10,409	104	.....	1,283	1,026 †	.....	762	100
Totals.....	\$71,102	...	\$3,560	\$6,835	.....	.....	\$6,835	...

Year	J Best Allocation of "E" If Only ½ Is Shifted (Millions)	K Best Allocation of "D" If Only ¼ Is Shifted (Millions)	L Effect of ¼ Shift Upon Payroll Index 1919-25 Av. = 100	M Construction Cost Index 1919-25 Av. = 100	N "M" "D" (Millions)	O "M"X"K" (Millions)
1919.....	.....	\$674	97	95	\$64,006	\$64,006
1920.....	\$341	426	117	120	102,240	51,120
1921.....	937	2,027	90	97	83,323	196,619
1922.....	330	1,447	90	84	86,856	121,545
1923.....	409	512	106	102	104,244	52,324
1924.....	787	985	100	103	114,433	101,455
1925.....	610	764	100	99	127,017	75,636
Totals.....	.....	\$6,835	...	...	\$682,119	\$662,705

"O" 97.2% of "N"

\* Only good years had any surplus.

\*\* Only \$101 million could be shifted without reducing the payroll index below 100.

† Only \$416 million could be shifted without reducing the payroll index below 100.

‡ Source of Construction Wages.

1921 obtains \$682 millions from 1920.

1921 obtains 624 millions from 1923.

1922 obtains 194 millions from 1923.

1922 obtains 101 millions from 1924.

1922 obtains 416 millions from 1925.

‡ Source of Construction Wages.

1920 retains \$341 millions of the total for 1920.

1921 obtains 341 millions from 1920.

1921 obtains 409 millions from 1923.

1921 obtains 101 millions from 1924.

1921 obtains 86 millions from 1925.

1922 obtains 330 millions from 1925.

1923 retains 409 millions of the total for 1923.

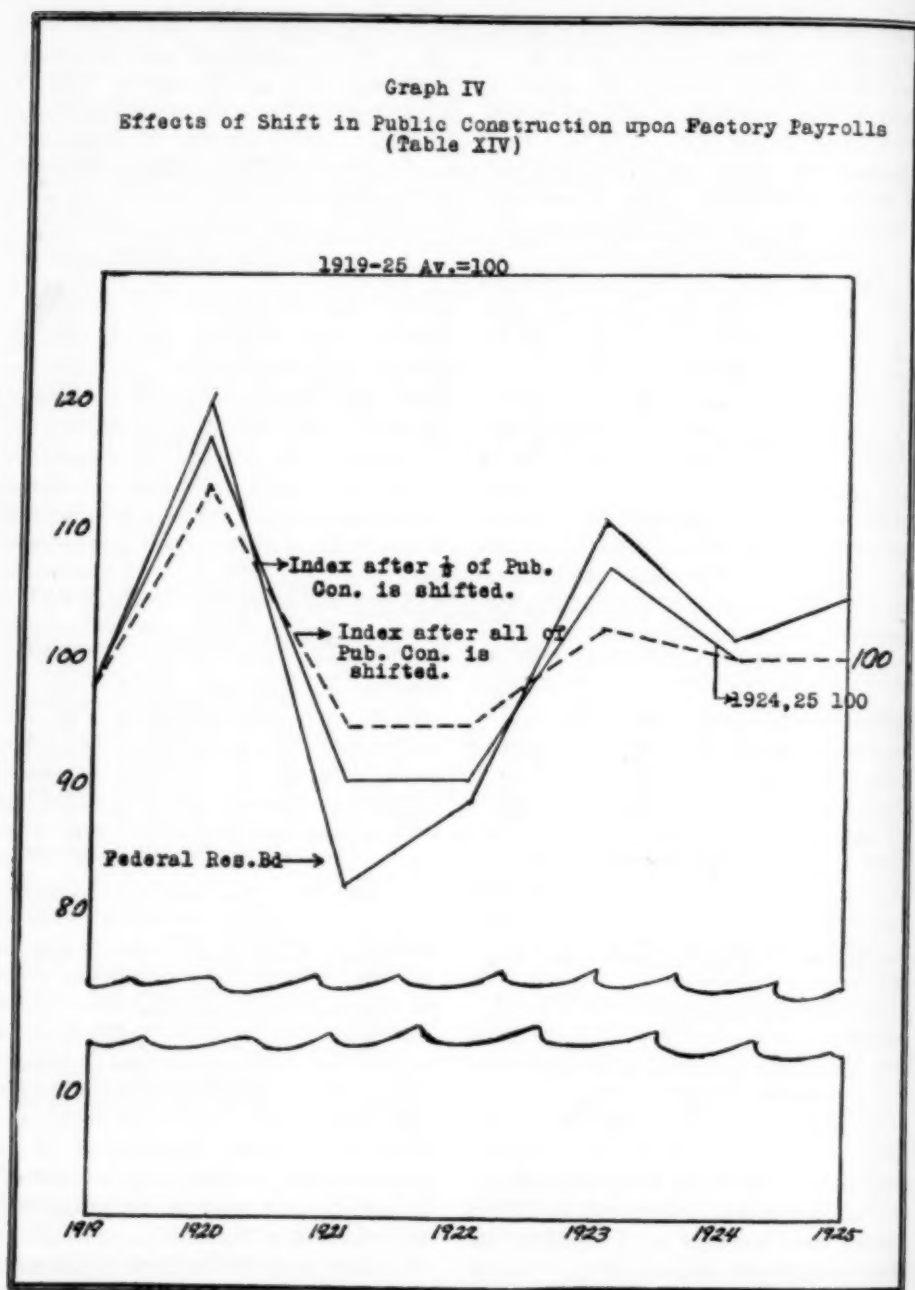
1924 retains 787 millions of the total for 1924.

1925 retains 610 millions of the total for 1925.

dictated in Column "L," Table XIV, and in Graph IV. However, the saving in construction cost is greater, being approximately 3 per cent as compared with 2 per cent when the employment index is used (Columns "N" and "O" of Table XIV). As already pointed out, such a figure measuring the economy of this eco-

nomic reform is misleading because of the lower price received for municipal bonds during 1921.

In this coordination of data one additional consideration must be weighed. The suggested shifts in construction are shifts in value rather than quantity of construction. On page 176 it is suggested that contracts aggregat-



ing \$341,000,000 might have been postponed from 1920 to 1921. However, the same quantity of construction would not have cost that much in 1921

because prices of materials and wages had fallen considerably. If the original appropriation for construction was decided upon after agreement was

reached as to the type, size, and quality of each building, and each mile of paved road, the total value of contracts let would have decreased in the

same proportion as construction costs. The value of the contracts let would presumably have fallen from 341 to 270 million dollars.

## CHAPTER V

### PRACTICAL OBSTACLES

In the introduction<sup>1</sup> it was stated that the purpose of this study was not to defend or oppose any particular plan to regularize employment by the long range planning of public works, but to measure the effects in quantitative terms. It might seem, therefore, irrelevant to discuss the practical difficulties that would be encountered in the shifting of public construction as suggested in the preceding chapter.

The amount of unemployment prevented, however, would be limited by certain considerations of a political and economic nature. Although the maximum per cent of unemployment that would have been prevented by shifting public construction in this fashion has been stated in the foregoing analysis, the following practical conditions, not heretofore mentioned, might make the actual results different from the anticipated:

1. The unreliability of business forecasting.

2. The difficulty of getting city officials to act quickly.

3. The appeal of public improvements as a campaign issue.

4. Municipal financing problems.

5. The effect of the sale of municipal bonds upon the supply of credit for private industry.

6. The difficulty of forecasting civic needs for improvements.

7. The tendency towards inefficiency in government construction.

8. Geographic and occupational shift of workmen.

9. Trade union restrictions on membership in the building trades.

The first objection to the tentative conclusions reached in Chapter IV is the difficulty of accurately forecasting fluctuations in employment. It is easy to look back over those seven years and subject public officials to criticism for not letting contracts during months of least employment, or when the costs of construction were lowest. It is easy to blame the persons responsible for spending the tax-payer's money in 1920 when it would have possessed much greater purchasing power the following year. Such criticism is just only in so far as it could have been made at the same time the misjudgment occurred. Was it possible for any well-informed student of business cycles to have prophesied in 1921 just when the costs of construction, for example, would reach their lowest level? Would it be possible today to predict the probable course of this cost index during the next few years with a view to initiating construction at the most advantageous time? Such insight into the future is beyond the realm of the finite intellect of mankind. It was not possible for the well-informed in 1920 to forecast the trend of prices in the two following years; and the same statement can be made regarding employment, interest rates on municipal bonds, the volume of public construction,

<sup>1</sup> *Ante*, p. 2.

and the wages paid to factory wage-earners.

This statement is made with due regard to the aims, hopes, and accomplishments of the various agencies making business forecasts, whether they be the private or academic type. Business forecasting may some day become reasonably accurate, but during this period of investigation, no one can be accused of political turpitude for failing to adjust public construction to the advices of these various forecasting agencies.

#### PLANNING PUBLIC CONSTRUCTION

Strange to say, the whole scheme of planning public construction does not presuppose the gift of divine prophecy in economic affairs, such as would be necessary to convert forecasting ability into stock market profits. To know when to buy and sell wisely on the exchange requires knowledge of impending events of the hour and day. Among stock speculators the movement of the market ten points may mean loss instead of profit; it might be the difference between fortune and bankruptcy.

Such rapid changes in that speculative center are not reflected immediately in employment statistics. Weeks and even months may intervene before there is any appreciable effect upon the number of persons employed or unemployed. The trend of the market in one direction must be persistent and stubborn to create any important change in the daily occupation of the great rank and file of wage-earners. Hence, in the problem of stabilization of employment the difficulty of predicting the immediate movement of the prices of stocks and bonds does not enter.

The foregoing analysis, moreover, begins with postponement rather than advancement of public construction.

The problems in chronological order are—first, to withhold contracts until the state of employment becomes less favorable, and second, to build in advance. Advancing or accelerating the letting of contracts is the more difficult project because it not only requires knowledge of future construction costs, but also of the future need for certain specific public improvements. It seems fortunate that the long range planning of public construction is much more concerned with postponement, the easier shift.

If the success of this whole plan rested upon the accuracy of business forecasting, it would doubtless have been abandoned years ago. All of these various agencies might be entirely wrong in their predictions and still not materially prevent this plan from operating. In other words, the success or failure of business forecasting has little to do with the whole plan.

It would be necessary for some agency to advise public officials when they ought to sell bonds and let contracts. It seems possible to fasten this apparently onerous burden upon a first class clerk in the Bureau of Labor Statistics at Washington. His duty would be to watch the index of employment and immediately inform the numerous public officials throughout the country whenever the index approached 5 per cent above or below the average of the preceding years. The per cent and number of years used in fixing the average would be determined by legislative discretion and the experience of the future. Five per cent might be conducive to excessive haste, thereby increasing or decreasing the volume of public construction too soon. On the other hand, it might be found that the corrective influence of public construction should have been invoked before the index changed 5 per cent.

The probability of this last consider-



ation seemingly increases when one considers the second practical obstacle—the delay that would doubtless be encountered after the Bureau of Labor Statistics had broadcasted the news. The wheels of public administration turn slowly. Frequently six to nine months elapse between legal authorization to build and the letting of the contract. In the meanwhile conditions might have become greatly changed for better or worse. Before this whole program could function effectively the local powers would have to be able and be disposed to act quickly. Herein lies what appears to be the insurmountable barrier, especially because action on the part of the federal government as regards its own construction is so unimportant as compared with action by local and state officials. From 1919 to 1925 the construction performed by the federal government constituted less than 2 per cent of the total public construction.<sup>2</sup> Of course this fact does not lessen the importance of federal leadership and initiative in the operation of the plan.

The crux of the problem is to get quick action by municipal, county, and state officials. This means preparation which requires that the preliminary steps in a large undertaking have already been taken. The authorization to build should have been secured in advance from the proper parties and, as nearly as possible, specifications, plans, materials, etc., should have been agreed upon. With these arrangements made in advance the usual delay might be cut down to three or four months.

#### POLITICAL INFLUENCE

But how could this willingness to act be secured? This presents one of the greatest obstacles. Ordinarily, the persons controlling the construction

policy are subject to the constituency through the ballot box. In order to hold office they must please the citizens who are always disgruntled about taxes, and especially so when business conditions are adverse. It would be political suicide to embark suddenly upon an expensive program of improvements accompanied by rising tax rates. The next election would usher in a new administration pledged to a policy of tax reduction.

There is another sense in which public improvement programs become the "football of politics." Political campaigns have been waged over hard roads, sanitary sewers, and city waterworks. The successful candidate convinced the people that the improvement was or was not needed, as the case might be. It is hardly possible to expect that politicians would be willing to give up this "issue" and let the ebb and flow of construction be determined by such a cold device as the index of employment; for they may have a vested interest in it.

Before this adjustment could take place, it would be necessary to improve the index itself. This study has been confined to employment in factories, the only industries which the Bureau of Labor Statistics watches closely; although recently data on employees in Agriculture, Transportation, and Mining have been added.<sup>3</sup> The index would necessarily have to include all the important industries. It should be weighted according to the number employed. Doubtless, manufacturing would be the most sensitive to the business cycle.

Assuming that the various public officials and their constituencies were willing to adjust their program of building to the general state of employment, the road is not yet cleared of practical

<sup>2</sup> National Bureau of Economic Research, *Business Cycles and Unemployment*, p. 354.

<sup>3</sup> *Engineering News-Record*, Jan., 1926, p. 45.

obstacles. How would these projects be financed?

As mentioned before, both taxation and bond issues would be employed. In those political divisions where improvements are financed out of current tax receipts, a sudden expansion in public construction would incur great hardship. Presumably, taxes would have to be increased to meet this expansion, or the city might switch over to the bond issue method, which would make bond selling harder for other cities, thereby aggravating the situation. It is doubtful if many city councils would want to increase taxes sufficiently to pay for the entire cost of this new construction, even if the assessed value of the city property and legal limitations would permit. In fact, a city using the former method usually tries to spend about the same amount every year.

#### CORRECTIVE PLANS

The only device for such cities is a sinking fund accumulated from taxes during years of prosperity. The experience with publicly controlled sinking funds has been decidedly unfortunate. The grade of public responsibility assumed by public officials does not seem to have improved any in recent years, and, in some quarters, the public treasury has been mismanaged. Certainly there would seem to be no reason for expecting greater success in the future than in the past. The funds thus accumulated might be invested only in six months' certificates of indebtedness of large cities or the federal treasury. Such opportunity for investment would prove insufficient to employ all the sinking funds seeking short time investment, thereby leaving considerable public moneys idle.

The alternative is to put the funds out at interest to commercial enterprises which might yield a large return; but such action is fraught with grave

dangers. There is the risk of losing the principal. Also, it would be very difficult to prevent an unscrupulous treasurer from joining with commercial paper houses and acceptance dealers in schemes to keep the public from securing the entire return from such investments.

For the purpose of argument, let honesty and integrity of public treasurers be taken for granted. What would be the reaction of the average citizen to this plan? It is only reasonable to expect that taxpayers would object strenuously to supplying the public with money to be expended at some indefinite future time, depending upon the index of employment. Many, doubtless, would prefer to keep their funds and wait until the emergency arose. The general mass of citizens would have to be much more keenly aware of the social and economic loss of these ever-recurring periods of joblessness before they would adhere to such a proposal. In order to get their consent they would have to be convinced that the benefits accruing therefrom would more than offset the dangers involved.

It has already been stated that the most unfavorable time to sell municipal bonds was in 1921. The selling price was very low that year. The average price would probably have decreased if the volume of indebtednesses had increased, due to the expansion of public works, to prevent the widespread unemployment. The money market would have been flooded with these securities. Business in general was on the down grade and funds were in demand. Orders were coming in slowly and many were cancelled. Executives were busy trying to keep their own houses in order and, both as individuals and as managers, were not disposed to invest heavily. At such a time, however, many people do prefer safe tax-exempt bonds to stocks. But the effective rate of

interest on municipal bonds tells the story.<sup>4</sup>

Nevertheless, the condition that would occur as a result of shifting additional construction and bond issues into 1921 presents a paradoxical situation. The purpose would be to stabilize employment, purchasing power of the laboring classes, the market for consumers' goods, and later on, the market for producers' goods. The steel mills, lumber, and cement companies would experience something akin to a boom. Capital equipment in these lines would be busy and earning dividends. These same companies would, without the shift in construction, have been seeking funds in the market. Under these changed circumstances they might have funds seeking investment. This would tend to relieve the money market directly and indirectly. Perhaps some of these surplus funds would have been invested in municipal and state bonds. In other words, the cause of the lowered selling price would also furnish a remedy.

Would these two forces equalize; would the latter exceed the former, thereby raising the selling price of bonds, or would the selling price fall? An answer would only be a conjecture. But this much is certain. If construction activity lagged far behind the sale of goods, the interim would witness a rapid rise of interest rates on these types of securities. After the contracts were let, materials sold, and laborers paid, the strain would be lessened and this rate of interest would fall. The extent of the damage would depend in part upon the foresight of bond buyers, who, seeing what would happen six months or a year later, would bid up the bonds as they were offered; also the rapidity with which the securities were put on the market, prior to the letting of the first contract, would be a determin-

ing factor. The contracts paid for, from current tax receipts, would have an immediate influence by increasing labor's purchasing power and orders to manufacturers. Therefore, the adverse effects upon the yielding power of tax-exempt securities would not be as great as they might appear at first thought.

#### NOVEL METHOD OF FINANCING

In this connection a novel method of financing has been suggested by A. L. Bowley.<sup>5</sup> This use of public works might be combined with debt retirement by the central government. The amount to be paid on the debt and the appropriation for improvements for a certain period might be distributed unevenly over the period of years. The amount spent for public construction would be large in depression years at the expense of debt payments. In prosperous years the same amount would be expended for these two items, but the debt retirement would receive more and public works less. He also proposes to use this fund in assisting local officials to initiate necessary improvements either by advancing funds or outright grant.

This scheme is unique and suggestive, especially for the federal government which is more able to plan its projects in advance. Converting this sum into a revolving loan fund might encourage local officials to act more quickly during bad years and, by refusing accommodation in prosperous years, create a tendency towards this objective. Professor Bowley firmly believes that the strong hand of the central government must function in order to bring local officials into line.

This problem leads directly to another. Through taxation and the purchase of public bonds funds are with-

<sup>4</sup> *Ante*, p. 188.

<sup>5</sup> *The Regularization of Industry*, Christian Order of Industry Series—5, p. 34 et seq. Trinity College, Cambridge, 1924.

drawn from the market, funds which might have found their way into private industries. What benefit would come from changing employees from a private company to the state? Doubtless some of the funds secured for public work would not mean any increase in employment generally. Because of the volume of credit being extended to various governmental divisions, the supply for private industry would be lessened, thereby curtailing employment.

This line of reasoning is subject to an important misconception. In 1921 prices were falling rapidly and production in some lines was intentionally decreased. Losses would have been increased by creating finished products out of raw materials, because of the decrease in prices during the time the goods were being manufactured. Under such circumstances additional credit might have postponed or obviated financial reorganization, but it would not have increased production proportionately.

#### DANGERS OF EXPANSION

Once the program of expanding construction had started and the idea had been universally approved, another danger would appear—extravagant expenditure. The needs of any community are not capable of exact measurement. It might be desirable to pave every road in the township, but not necessary. But generous public officials and interested contractors might properly urge the paving of all the roads in the township because it would afford employment. At the end of a period it is easy to look backwards and suggest that the public works which were built should have been erected at some other time during the seven years. Such an analysis starts with a certain volume of construction and proceeds to point out the best possible allocation with reference to the number of jobless

workers. It would have been much more difficult to reach such a decision at the time suggested. Such a program of public construction would incur over-expansion by encouraging well-meaning, sympathetic officials to build, and keep on building. Of course, this danger would not arise where a program is planned and adhered to over a period of years. But such foresight and budgeting is not always possible.

With this dangerous excess of construction, inefficiency might arise. Public works might degenerate into public relief works of the type Louis Blanc advocated in 1848. The work required might be slowly diminished and the general standards of efficiency lowered. Recent experience<sup>6</sup> has shown that such degeneration need not occur. If the work is submitted to contractors for estimates and the lowest bidder is awarded the contract, the problem of keeping down expenses is shifted to the contractor. It then becomes to his economic interest to see that there are no wastes in production, hence the question of efficiency rests upon other shoulders.

#### OBJECTIONS TO REMEDY

Opponents of this proposed remedy for cyclical unemployment have put forth another objection. Would the contractor employ the jobless workmen or would it mean that his regular force would get in more days during the year or be paid for overtime? Extra hours at increased rates would be too costly for the employer and he would usually find it more economical to hire additional labor.

In the interest of productive efficiency the contractor should be permitted to select his own workmen, or at least the key men in his working force.

<sup>6</sup> Morley, Felix, *Unemployment Relief in Great Britain*, p. 186.



Perhaps experience might prove the German method expedient. Since the war the central government has assisted local officials in initiating necessary public construction by paying part of the costs. All contracts let under this scheme specified that about four-fifths of the workmen should be secured from the free employment exchange. In this way the jobless man registered with the exchanges secured employment, thereby getting the benefit of the public works.

According to Felix Morley,<sup>7</sup> productive efficiency has been maintained at a high level under the German plan. Obviously, the lack of national employment agencies make such a scheme impractical for this country.

Several students of unemployment have emphasized the occupational and geographic shift of workmen which such a plan would require. It appears that some have the idea of moving a worker from a steel mill in Pennsylvania to a dredge boat in Seattle. No such mobility of labor is necessary. In general, public construction in one state bears a rather close relation to the population. (This study has not determined the relationship between local unemployment and the volume of public construction.) There are many different classes of public works, some urban and some rural.

Although the geographic shift would not be very difficult, the change in occupation presents several serious problems. Would it be possible to turn clerks into hod-carriers, clothing cutters into teamsters? How would restriction of membership in trade unions affect the situation? The problem is made more difficult by restricting this study to employees in manufacturing plants. If public construction was used to absorb unemployment among factory workers only, the shift to new occupations would not be easy. But if

the plan is examined as a means to assist workers in all crafts, trades, and industries, this change in occupation appears as a less difficult obstacle.

This brings up the question, what per cent of the appropriations for public works is going into the pockets of local labor?

There is no conclusive answer to this question. In Philadelphia where wage rates are high, 34 per cent went to local laborers.<sup>8</sup> In Champaign, Illinois, a prominent contractor<sup>9</sup> said his local labor cost seldom exceeded 25 per cent and frequently went below that. Regardless of what the average for the whole country might be, it is clear that the employment furnished by public construction is not restricted to local building laborers and local unskilled workmen, but its important influence upon the demand for labor is in transportation, steel, cement mills, and lumber yards. Hence, the problem of occupational and geographic shift occasioned by this economic reform is not as serious as usually indicated. And it is to be remembered that even the purchasing power of the hod-carrier on a dam in Arizona may start the Troy collar factories operating. It seems reasonable to conclude that this difficulty has been greatly over-emphasized.

Trade unions are very careful about letting their membership increase too rapidly. If the public buildings erected during a depression year required more men than the local union could supply, pressure would be brought to bear upon the business agent to let other men join the union. Probably the officers of the organization would insist upon letting the old members work overtime, thereby obvi-

<sup>7</sup> This figure was obtained through correspondence with the editor of the *Engineering News-Record*.

<sup>9</sup> English Bros., Champaign, Ill.

<sup>1</sup> *Op. cit.*, p. 186.



ating the necessity of increasing the membership. Perhaps the local leaders might be induced to give temporary membership or work with non-union men for a short time. Even some modification of the German plan might be

used. This obstacle is small but hard to overcome. Perhaps the trade unionist would make concessions because this proposed scheme is urged in the hope of bettering the laboring classes.

## CHAPTER VI

### SUMMARY AND CONCLUSIONS

This study has investigated the effects of shifting public construction from one year to another in the period 1919-25. The first three chapters are devoted to a discussion of the employment situation as it actually was; in Chapter IV the expected effects of shifting construction on unemployment, volume and costs of construction are considered; Chapter V takes up the practical obstacles which might make the actual results different from those stated in Chapter IV.

Before drawing any conclusions from this study, it is necessary to review the peculiar features of the period. During the years of the World War, public construction was at a very low ebb, all activity being directed towards winning the struggle. Soon after the armistice, public officials turned their attention again to the problems of peace. Numerous plans for public improvements were taken out of their war time files and revised for immediate use. Before the first anniversary of the armistice, cities were trying to surpass each other in the amount of building. This rampant activity became greater with each succeeding year until many became alarmed at the volume of bonds being sold. Obviously these seven years witnessed an abnormal expansion in governmental expenditure for public works and caution must be observed in making any statements based thereon.

Hand in hand with this expansion in

public work, there was also a great development in all lines of private industry. New plants sprang up, new lines of industry emerged and a buying public watched prices rise rapidly. Prosperity reached its peak early in 1920 and suddenly vanished in the fall of 1920. The upward march of prices and employment was resumed in late 1922, lasting until the present.

To some extent this great activity on the part of private enterprises was matched by the abnormal expansion of public construction. The volume of public construction was unusually great; but so was the quantity of private employment. Fluctuations from the average index of employment were more difficult to correct because that average was so high.

It is not the purpose of this study to generalize upon the possibilities of using public work to prevent cyclical unemployment for all time to come, but only with reference to the years 1919-25. This limitation undoubtedly lessens the usefulness of the study; yet such caution seems preferable to making questionable generalizations for all periods.

Another inherent weakness is that all statements are made with reference to factory unemployment exclusively. The problem of the factory laborer is the most important because of the large number employed and the irregularity of factory work.

## RESULTS OF RESEARCH

With these preliminary remarks out of the way, the summing up of the results of this research are as follows:

1. The value of public construction contracts let during the period ranged from \$674,000,000 in 1919 to \$1,283,000,000 in 1925. This represents a fairly even growth except for the year 1921 when no appreciable increase was experienced.

2. The total amount of wages paid to factory employees fluctuated greatly, but the figure for 1925 was \$10,409,000,000 which was about one-half of one per cent less than the sum for 1919.

3. If all of the public construction had been perfectly allocated during these seven years, the wages paid thereon would have been sufficient to compensate for the losses incurred by laborers in factory jobs. In other words, the index of employment could have been 100 for each year.

4. If only one-half of the public construction of any one year could have been shifted, the wages furnished thereby would not have been sufficient to have prevented all the unemployment of 1921 and 1922. However, a considerable portion of the unemployed would have been given jobs. In the former year the index of employment would have been raised from 86 to 95, thereby absorbing about two-thirds of the unemployment of that year.

5. It is difficult to determine the net effect of this shifting of construction out of good years and into lean years upon the cost of construction. The period of greatest unemployment preceded the months of lowest wages and prices of materials. Some of the shifting encountered increased cost. Taking the period as a unit, the saving in cost would be only 2 or 3 per cent at the most. This conclusion does not concur with the arguments advanced by cham-

pions of this economic reform, who claim it would greatly reduce the cost of public construction.

6. This saving of 2 or 3 per cent might have been entirely offset by the loss involved in selling bonds during the bad years when interest rates were unfavorable to the borrower. Of course, the improvements paid for out of current taxes would not be influenced by these changing rates of interest. Furthermore, it is probable that the selling price of municipal bonds would not have fallen so low if a large volume of public construction had gotten under way in 1921. The exact loss for the period cannot be estimated, because the bonds were sold six to nine months before the contracts were let. At any rate, the final conclusion on the cost question is neither favorable nor unfavorable; the efficacy of this proposed shifting of public construction cannot be determined by the issue of extravagance and economy in the expenditure of taxpayers' money.

7. The results are somewhat different when the payroll index is substituted for the employment index, as shown in the Table XIV. This index, although useful, is not so well adapted to the purpose at hand, because it is the product of two variables—employment and wage rates; the latter being a variable which this shifting of public construction would tend to eliminate.

8. The foregoing conclusions cannot be considered apart from business psychology. An economic depression is partly due to lack of confidence in business. It is possible that the letting of numerous construction contracts would have a tendency to restore confidence and start the wheels of industry moving regularly. Such a stimulating effect would enhance the possibilities of this program in the stabilization of production beyond the limits indicated in Chapter IV.

9. Geographic mobility of labor would not seem to have been necessary in any great degree, as public construction was not confined to any one section of the country, but its distribution roughly corresponds to the population. Occupational mobility appears to have been overemphasized as an obstacle, because of the comparatively small per cent of the construction price that goes to local laborers actually employed on the job.

10. Trade union coöperation would be necessary for the operation of such a program. The influx of workers into the construction trades would have to be permitted even if these new wage-earners were granted only temporary membership in the union. The number of new workers would be largely determined by the occupational mobility discussed above.

11. Lastly, the whole proposition presents a challenge to the agencies of social control. It is believed that strong initiative on the part of the federal government would be required to operate the plan. Even then, it would be difficult to hold the ephemeral local administration in line with the larger program. Unity of action could only be secured by the exercise of federal power. Although it is not the intent of this thesis to outline a complete plan for operation of this scheme, it may not be amiss to suggest certain lines that could be followed. The government might refuse assistance to hard roads built during years of great prosperity. In the administration of educational grants to high schools, assistance might be refused those communities which erected their school buildings during years when there was little unemployment. Sinking funds arrangements would not be desirable. Debt restrictions now placed upon cities would have to be lifted or made less rigorous. When employment fell a

certain per cent below the average of a period of years, action would be taken to increase construction activity. Such a rigid per cent would doubtless fall short of the ideal, but some rigidity is necessary in order for social control to function. Considerable advance budgeting of needed construction would be required of municipal officials to enable them to act quickly upon the advice emanating from Washington.

As previously stated, the purpose of this study is not to advocate this economic reform, but merely to show its possibilities and limitations. Consideration is given to the redistribution of employment during the period, taking jobs out of good years and putting them into lean years. It might be called "robbing Peter to pay Paul." It has become fairly well accepted, however, that industrial progress would be more rapid and human life more enjoyable if both the extremes of prosperity and depression were less pronounced.

One other thought seems pertinent. The introductory chapter emphasizes the quantitative nature of the investigation. It has been found impossible to state every thought in terms of numbers, volume, and dollars. Perhaps there has been too great an attempt to secure objectivity. The inevitable result has been the revealing of the limits of the quantitative or statistical method in this field.

In conclusion, it is repeated: that the volume of public construction was sufficient to have prevented the major portion of factory unemployment if this construction had been properly allocated; that this shifting of construction would not have materially affected the cost of construction for the whole period; that the political obstacles are forbidding, but not insurmountable, if enlightened public opinion wholeheartedly desires to partly eliminate the evil of unemployment.

## BIBLIOGRAPHY

## BOOKS

- Adams, T. S. and Sumner, H. L. *Labor Problems*. 1910.
- Batten, Edward. *The Solution of the Unemployment Problem*. 1926.
- Berridge, W. A. *Cycles of Unemployment*. 1923.
- Beveridge, W. H. *Unemployment: A Problem of Industry*. 1909.
- Bowley, A. L. *Is Unemployment Inevitable?* Part IV. 1924.
- Carlton, F. T. *History and Problems of Organized Labor*. 1920.
- Cole, G. D. H. *Out of Work*. 1923.
- Commons, J. H. and Andrews, J. B. *Principles of Labor Legislation*. 1920.
- Feldman, H. *Regularization of Employment*. 1925.
- Hart, H. H. *Fluctuations in Unemployment in Cities of the United States*. 1918.
- Hobson, J. A. *Economics of Unemployment*. 1923.
- King, W. I. *Employment Hours and Earnings in Prosperity and Depression*. 1920-22. 1923.
- Kirkconnell, W. *International Aspects of Unemployment*. 1923.
- Klein, P. *The Burden of Unemployment*. 1923.
- Lescohier, D. D. *The Labour Market*. 1919.
- Lewisohn, S. A. and Others. *Can Business Prevent Unemployment?* 1925.
- Morley, Felix. *Unemployment Relief in Great Britain*. 1924.
- National Bureau of Economic Research. *Income in the United States States 1909-1919*. 1921. *Business Cycles and Unemployment*. 1923.
- Persons, Foster, and Hettinger. *The Problem of Business Forecasting*. 1921.
- Pigon, A. C. *Unemployment*. 1913.
- President's Conference on Unemployment, 1920. Committee Report. *Seasonal Operation in the Construction Industries*. 1924.
- Rees, J. M. *Unemployment as an International Problem*. 1926.

- Schloss, D. F. *Insurance against Unemployment*. 1909.
- Vogel, J. F. L. *Unemployment, Its Causes and Cure*. 1925.

## PERIODICALS

- American Labor Legislation Review*. Vol. 9-16. 1919-26.
- Architectural Record*. Vol. 59, No. 1. January, 1926.
- Bradford, E. S. "Methods of Measuring Unemployment." *Quarterly Journal of the American Statistical Association*. Vol. XVII. pp. 983-94. December, 1921.
- Building Reports*. F. W. Dodge Corporation. 1919-25.
- Bulletin of the University of Wisconsin. Economic and Political Science Series. "Constitutional Restriction of Municipal Debts." Vol. 8, No. 1.
- Engineering News-Record*. Vol. 82-96. 1919-26.
- Federal Reserve Bulletin*. Vol. 8-12. January, 1923, February, 1926.
- Hearings before Senate Committee on Education and Labor on S. 5397 introduced January 21, 1919.
- International Labour Office Bulletin*. "Remedies for Unemployment." 1922.
- Massachusetts Department of Labour and Industries. Labor bulletins. No. 143, 146.
- New York Department of Labor. *The Industrial Bulletin*. February, 1921.
- Public Works*. Vol. 52, No. 8. February 25, 1922.
- Regularization of Industry*. Christian Order of Industry Series. No. 5. Trinity College, Cambridge, 1924.
- U. S. Bureau of Census: Census of Manufactures, 1919, 1921, 1923. Financial Statistics of States and Cities. 1925.
- U. S. Bureau of Labor Statistics. *Monthly Labor Review*. Vol. 8-22. 1919-26.
- U. S. Bureau of Labor Statistics. Bulletins Nos. 311, 353, 354, 381, 387.
- U. S. Department of Commerce. Commerce Year Book. 1925.



## Book Department

KEITH, ARTHUR BERRIEDALE. *Responsible Government in the Dominions*. Second Edition, rewritten and revised to 1927. 2 vols. pp. 1339. Oxford: Clarendon Press, 1928.

This new edition of Professor Keith's comprehensive and monumental treatise contains extensive changes and additions from the edition of 1912. The earlier work has been largely rewritten, and in many places condensed, so that, even with the large amount of new matter, the three volumes of 1670 pages have been reduced to two volumes of 1339 pages. In this the author has made use of material from other books of his own published in the interval: *Imperial Unity and the Dominions* (1916), *Dominion Home Rule in Practice* (1921), and *War Government in the British Dominions* (1921).

In the preface, Mr. Keith calls attention to developments in the Dominions along lines proposed or suggested by him in his *Imperial Unity and the Dominions*. The new material in the present edition deals with many topics: The Irish Free State and Northern Ireland, India, Malta and Southern Rhodesia; the dismissal of ministers, Dominion coöperation in the World War, the international status of the Dominions, the Dominion mandates, the problems of nationality and judicial appeals to the Privy Council, the position of churches, and the Imperial Conferences of 1917, 1918, 1921, 1923, and 1926.

The revised edition will take the place of the former edition as the standard work of reference on the British Dominions. It represents the work of one who has both a high reputation as a scholar and practical experience in the administration of the affairs on which he writes. A barrister and member of the faculty of advocates in Scotland, he has published important works on Sanskrit, Buddhist philosophy and Indian religion, and is now Professor of Sanskrit and Comparative Philosophy and Lecturer on the Constitution of the British Empire at the University of Edinburgh. He served for a time in the Colonial Office,

and has been Secretary to the Crown Agent for the Colonies, Assistant Secretary to the Imperial Conference, and Permanent Under-Secretary of State.

JOHN A. FAIRLIE.

COLE, TAYLOR. *The Recognition Policy of the United States Since 1901*. With a foreword by Pitman B. Potter. Pp. xi, 100. Price, \$2.00. Baton Rouge: Department of Government, Louisiana State University, 1928.

In this little volume of a hundred pages Mr. Cole demonstrates that the recognition policy of the United States has been the result of a fusion of de facto recognition, the application of legitimist principles, and the consideration for special exigencies. The emphasis has shifted from administration to administration. Recently the ability and willingness of governments to meet their international obligations has received increased attention. This criterion is not a recent innovation to meet the Mexican and Russian situations. It has been an implied, if not an expressed, part of the recognition policy of the United States ever since 1792.

JOHN G. HERVEY.

MARRIOTT, JOHN A. R. *Second Chambers*. Pp. vi, 250. Price, \$3.50. New York: Oxford University Press, 1927.

In the revised edition of John A. R. Marriott's *Second Chambers*, Oxford, 1927, we have a scholarly defense of bicameralism. It reflects the traditional British attachment to institutions created in the past, though in a democratic state they are anomalous. One will find in the prairie provinces of Canada strange procedural quirks which have no apparent reason, but they are persisted in because they perpetuate the memory of some struggle between a despotic king and his burghers hundreds and hundreds of years ago. Mr. Marriott has almost nothing to say of these Canadian Provinces which after long internal struggles succeeded, with exception of two, in abolishing the upper house, but he has



much to say of the bicameral legislatures in various states of Australia though the same tendency has already appeared there, that of abolishing a useless upper house. He shows that the British Parliament became bicameral shortly after its creation and has continued so to the present time with the exception of the revolutionary period of the Commonwealth. Yet there has been a steady loss of power in the upper house until it is now a shadow of its former self.

Our author with many others believes that the process has gone too far and would reform and strengthen the second chamber in order that it may perform what he regards the essential functions of such a body, namely, to check and revise the hasty action of the popular body. And also he sees the necessity of a second chamber in any federation of states. No doubt this last assertion is based upon the truth, for small states upon entering a federation demand equal representation and large states seek representation upon basis of population and wealth. The bicameral system offers a compromise by which these two demands are satisfied. Yet as the United States becomes a nation and the senators cease to represent their states but instead represent the interest of their section, the result is that we have in the Senate a rule of minorities often picturesque, frontier, and sometimes even clownish. The end men of the Senate whose function is to amuse the galleries generally come from these rotten boroughs. It was in the Senate that President Coolidge after being given a tremendous popular mandate found defeat after defeat. When we turn from the federal government like our own to a unitary government like that of France we find that the stronger the second house the weaker will be the government of the day, sometimes literally the government of a day. The French Senate is the strongest upper house in Europe and for that reason the greatest nuisance. The German Reichsrat is but a shadow of the former Bundesrat, yet both are effective organs of legislation because they are composed of administrative officers whose duty it will be to enforce the law when enacted. The ordinary course of legislation is to pass from the government to the Reichsrat and then to

the Reichstag with or without the approval of the Reichsrat. In other words, the Reichstag is the unicameral legislature which does not act blindly but upon the advice of an administrative body, the Reichsrat. Is this after all not the proper method of legislative preparation by administrators and experts with final action by the representatives of the people? Opposed to this scientific method of legislation is the old method of introduction of thousands of bills unrelated to each other and inconsistent with each other and then subjecting this vast mass to the sifting process of successive legislative bodies. The Florentines at one time had five legislative bodies to which all bills were presented by the government. Five are better than two when the old methods are employed.

JENNINGS, WALTER W., PH.D. *Introduction to American Economic History*. New York: Thomas Y. Crowell Company, 1928.

Should the writer of a text in history try to organize and interpret the discrete facts of his subject? Should he try to leave with the student a feeling that history is concerned with an integrated and living process? If so, this book is a failure. Sixteen main subjects, and under these, innumerable sub-topics, are traced throughout the three hundred years of our history. In discussing agriculture alone the author paces to and fro over the three centuries more than twenty times. There are valuable charts and maps, and innumerable details, presented with reasonable accuracy and care, and as a brief encyclopedia of economic history the work is well done, except that the encyclopedic form would have been more appropriate.

WITT BOWDEN.

VAN STRUM, K. S. *Forecasting Stock Market Trends*. Pp. 315.

CARRET, P. L. *The Art of Speculation*. Pp. 365. Price, \$3.00. New York: Barron's, 1927.

These two volumes might well be called the long and the short of stock speculation. Van Strum is interested in the broad price swings characteristic of the stock market as a whole and comprehending periods of one

to three years. Accordingly he surveys the vast fields of commodity prices, industrial production and finance comparing, through the medium of historigrams, many series of data with the Dow-Jones Index of Industrial Stock Prices, some series of which show a sufficiently close relationship to stock prices to suggest desirable points of purchase and sale.

Caret, in contrast, is interested in the stock market in its detail. Considerable space is devoted to a description of the machinery for trading and how to trade.

Both books are designed for popular reading. While *Forecasting Stock Market Trends* is somewhat more substantial, the various comparisons made are anything but conclusive, and for that reason the book as a whole will be found to be less interesting reading than the lighter treatment in *The Art of Speculation*.

WRIGHT HOFFMAN.

NOURSE, E. G. *The Legal Status of Agricultural Coöperation*. Pp. 555. New York: The Macmillan Company, 1927.

This is another of the series of Investigations in Agricultural Economics being developed under the direction of the Institute of Economics. The title to this work is much too limited. Instead of being strictly a legal treatise, it is a comprehensive, and at many points detailed, study of the development and present status of agricultural coöperation in the United States. The framework of the report consists of a careful analysis of the leading laws relating to agricultural coöperation; but to properly present these laws, the author has delved deeply into the history of the coöperative movement, presenting particularly the economic philosophy of the pioneers of the movement.

The study is thus an economist's interpretation of the coöperative movement in agriculture with particular reference to its legal phases. This fact is interestingly illustrated at one point (p. 136) where the author observes that:

Laws of the Kentucky type, on the one hand, and those of the Wisconsin (1911) and California (1909) types, on the other, proceed from quite divergent philosophies of coöperative organization. . . . Nevertheless, it would be difficult

indeed for anyone who sought to gain an understanding of the various phases of coöperative organization merely from a study of the laws to get any adequate clue to these differences.

The author accordingly analyzes the underlying theories, the leading forms, and the leading methods of coöperative organizations. The style is clear and pleasing, the selection and development of material is well balanced and with no note of bias; altogether it is a work of outstanding merit. Selected appendices give the leading types of coöperative laws as well as the best examples of marketing contracts and membership agreements. Ninety-seven cases are cited.

WRIGHT HOFFMAN.

AERONAUTICAL CHAMBER OF COMMERCE OF AMERICA. *Aircraft Year Book, 1928*. Pp. xv, 551. Price, \$5.25. New York: Aeronautical Chamber of Commerce of America, Inc., 1928.

The year 1927 was full of epochal events in the field of aeronautics. The relative importance of these can hardly be appreciated by the casual or even interested reader. In this tenth volume of the *Aircraft Year Book*, the record breaking flights of this outstanding year are carefully chronicled.

This is the one part of the volume that might be said to have a popular appeal. The remaining pages are replete with informative data, pictures and drawings of practically all of the important developments in the field of aeronautics during 1927.

Civil aviation in the United States is thoroughly surveyed. The various entrants in the air-mail field are described from the standpoint of personnel, equipment, service and rates. Developments in aerial service, such as photography, mapping, surveying and airplane dusting are outlined.

Each chapter of this best of ten Year Books is of value to those whose work or interests lie in the field of transportation. The discussions of airships, balloons and technical developments in aviation are most authoritative and still not too technical for others than specialists in these fields.

This volume fills a very definite present need, as has each of its nine predecessors. Probably its greatest value, however, will be realized in the future by students of transportation working in various branches of this rapidly developing field.

STEPHEN B. SWEENEY.

PAGE, VICTOR W. *Modern Aircraft*. Pp. xvi, 855. Price, \$5.00. New York: The Norman W. Henley Publishing Company, 1928.

This book is intended primarily for instructional purposes. It is not designed to be an engineering treatise, but it treats thoroughly of the various technical phases of aviation with which those interested in the actual operation of aircraft must be familiar.

Aircraft types, aerofoils, wings, landing gear, power plant, propeller construction, inspection and maintenance as well as instruments and aerial navigation are all described in a readable, accurate manner that substantiates the writer's reputation as an instructor. The carefully selected and arranged pictures and the clear diagrams alone make this a valuable reference work.

STEPHEN B. SWEENEY.

HOMAN, PAUL T. *Contemporary Economic Thought*. New York: Harper & Brothers, 1928.

Through a skilfully written series of essays which present with commendable thoroughness and scrupulous fairness the widely diverse and mutually incompatible ideas of Clark, Veblen, Marshall, Hobson and Wesley C. Mitchell, Professor Homan has succeeded in disclosing a measure of the confusion of thought which besets economic science in our day.

Marshall and Clark represent the classical tradition. This line of development is characterized by its attempt logically to deduce from the postulates of institutional permanence, hedonism and competition, a system of laws of universal validity. These laws are centered around the mechanics of value and distribution and, by reasoning from the analogy of physical science, they demonstrate that economic, like physical, forces tend toward a state of equilibrium.

It is in the brilliant theoretical abstractions of Clark that the system appears in all the beauty of its logical perfection, providing, as it does, a sweeping defense of the competitive economy. Marshall's work, at once more real and logically less precise, through its clear definition of its postulates, its thoroughness and the tentative nature of its conclusions, provides the neo-classical school with its main body of doctrine and establishes its author as "the greatest of modern economists."

Hobson represents another strain, the economics of welfare. Still retaining the familiar tools of logical deduction, he has set himself to the task of constructing an alternative system, centering about the struggle of various economic groups for a produced surplus, which, despite his inconsistency and occasional superficiality, affords an argument for social control in the interest of human well-being.

In Veblen we have the radical philosopher, the prejudiced critic, the satirist who, behind his scientific pose, does not scruple to handle facts with violence that he may the more vehemently condemn the competitive order. It is his work, in the main, which has shaken the grip of Marshall and Clark on the minds of economists and led to the formulation of economic inquiry in terms of process rather than normality.

This is the point of departure of the modern school of so-called institutional economics, which, by taking over from biology the analogy of organic evolution, proposes to use the tools of history and statistics inductively to record the cumulative change of economic institutions. Those economists who find themselves in this camp are busy with individual problems, which promise in their solution more clearly to guide public policy toward the attainment of human welfare. Since they are skeptical of all logically consistent systems of economic principles, they are attempting the construction of no generalized body of doctrine, although, as the author tells us, "they entertain a somewhat attenuated hope that out of their labor may ultimately arise some sort of synthesis that will constitute a generally acceptable body of economic theory."

While Professor Homan definitely dis-

avows any economic faith of his own, it seems fairly clear that his heart is here. "If Veblen is the Messiah" of institutional economics, he tells us, "Mitchell is at least the high priest," and it is to the application of statistical technique to the solution of specific institutional problems, that he seems to look for the development of economic theory in the coming years.

CLAIR WILCOX.

BUKHARIN, NIKOLAI. *The Economic Theory of the Leisure Class*. Pp. 220. Price, \$2.50. New York: International Publishers, 1927.

Bukharin, a Soviet official, first wrote his attack on "bourgeois" economic theory in 1914. It was published in Russia in 1919 with a dedication "to Comrade N. L." It now appears in an American edition with the author's assurance that it "is still perfectly valid from the theoretical standpoint." Although it is avowedly a criticism of the position of all of the so-called Austrian school of economists, the ideas of Menger, von Wieser, Jevons, Walras and Clark are mentioned but incidentally while Eugene von Böhm-Bawerk is made to bear the brunt of the attack.

Böhm-Bawerk's theory, it appears, is an outgrowth of the class psychology of the *rentier*. By representing the distribution of wealth as a natural phenomenon rather than as a process resulting from historical evolution, it aims to refute Marx and to provide a complete apology for capitalism. The theory errs in its unhistorical assumption that a temporary institutional arrangement is universal and permanent. It errs in its emphasis of the interest of the consumer, a possible parasite, rather than that of the producer, a worker. It errs, also, in adopting a subjective, individualistic instead of an objective, social approach to the problem of value. The Austrian value theory, as the author makes clear, fails to appreciate that subjective valuations are affected by objective values, fails to explain the external objective factors and fails, finally, in its attempt to translate its unreal atomic valuations into the social values of the real world. In contrast to this system of falsehood and of error, stands the theoretical work of Marx, whose ideas

of surplus value, concentration and revolution, confirmed by experience, establish him as the legitimate heir of the classical tradition in economic science.

Thus our author achieves his victory over the liberal economists by exhuming the corpse of Böhm-Bawerk and valiantly running it through with his critical sword. But of Marshall, of Davenport, of Cassel we have no word. Nor is there any mention of those younger economists who, rejecting Jevons and all his works, still fail to embrace Marx as the true prophet. Nor has the author succeeded in proving Marx right simply by proving Böhm-Bawerk wrong. The work altogether is tedious, repetitious and verbose. Conservatives may rest assured that it is unlikely to lead to the cannonading of the House of Morgan.

CLAIR WILCOX.

*The Municipal Index for 1928*. Pp. 719. New York: American City Magazine Corporation.

This annual improves steadily not merely in the matter of information, but in its classification and presentation. It is primarily, as its name indicates, an Index; but it is far more, in that it presents excellent summaries of various developments. Much of the material has already been printed in *The American City*, but that does not diminish its value. The extensive lists of public officials seem to be as accurate and as up to date as it is possible to make them. Among the lists are those of mayors and city managers, bureaus of municipal research and taxpayers' associations; real estate boards of cities over 30,000 population and their secretaries (a new feature); local safety councils in the United States affiliated with the National Safety Council (a new feature); park and playground officials; state and county engineers (a new feature) and state chambers of commerce (another new feature). The Water Works statistical section of 1927, too, is supplemented by a list of Water Works superintendents of cities over 10,000 population.

Among the outstanding articles there are to be noted: "Model Accounting System for Municipalities"; "Means of Reducing Traffic Accidents and Street Congestion"; "The Snow Removal Problem"; "Codifica-



tion of Municipal Ordinances" with a list of available model ordinances; and Reports on Street and Highway Lighting and Public Regulation and Operation of Public Utilities. The statistics given include street construction, outdoor municipal swimming pools, fire losses, power plants and their equipment, motor truck maintenance, and city finances. The figures are those of the 1927 reports.

C. R. W.

WINKLER, JOHN R. *W. R. Hearst*. Pp. 354. Price, \$4.00. New York: Simon and Shuster, 1928.

Hearst's executives, and there were myriads of them, were accustomed to wonder and ask if they were working "for a man, a daemon or a demigod," and after reading this highly interesting book, one is apt to ask the same question. Mr. Winkler, who is a trained newspaper man and wields a facile pen, holds no brief for any particular point of view. He describes Hearst as he is and has been, and leaves the reader to form his own conclusions. He describes Hearst's "sense of showmanship," which in its way equalled that of Barnum. He analyzes his understanding of the public temper and temperament, which he utilized with "a skill probably unsurpassed in his time." He recounts "Hearst's uncanny journalistic sense," which was beyond that of his most brilliant subordinates, of whom there were many, and much beyond that of any newspaper editor of modern time. He possessed the ability "to scent, and if necessary, make news (*italics mine*)" to an unprecedented degree. His ability as a "boss killer" is recounted at length as is his own career as a supreme autocrat. We are told of his amazing exploits beginning at the age of twenty-four with the resuscitation of the old San Francisco *Examiner* and continuing until the present time, when at the age of sixty-five, Hearst owns thirty newspapers in seventeen cities; nine magazines in America and three in England; eight news features and film services and the Cosmopolitan Book Corporation. We are told of his widespread political experience much that is quite as astounding as his journalistic one.

Late in 1927 he sent a telegram to the editor of one of his papers in which he said,

"Important thing for newspaper to do in making circulation is to get excited when public excited. People will buy any paper which seems to express their feelings in addition to printing the facts." The latter, however, appears to be secondary. This statement may be said to epitomize Hearst's philosophy. At times he has appeared to be on the side of the people as against privilege, but one feels, after reading this account of his life, that circulation and success were his real goals, not the public welfare. One lays down this fascinating story of a modern Monte Cristo, echoing Mr. Winkler's concluding words, "If he had his life to live over one wonders if Hearst would tread the same path. Would his motto again be 'Capture the crowd at any cost!' Or would he elect to employ his astonishing talent to ennoble, to spiritualize the crowds? No one can tell. For but once or twice in a century does an immeasurable phenomenon come before us for survey and appraisal."

CLINTON ROGERS WOODRUFF.

ASBURY, HERBERT. *The Gangs of New York*. Pp. xviii, 400. Price, \$4.00. New York and London: Alfred A. Knopf, 1928.

Mr. Asbury, descendant of Methodist bishops, protests that he is writing no sociological treatise. If his book be compared to such as Dr. Frederick Thrasher's *The Gang*, it will be seen that he is, strictly speaking, correct. But he has written an immensely more readable book than Thrasher's; one devours its pages eagerly as though it were thrill-laden fiction rather than fact.

Mr. Asbury's method is that of straightforward narration; he does not encumber his pages with footnotes, but he appends a fairly long bibliography, with a notation to the effect that "most of the material in this book was obtained from the newspapers and magazines, from police and court records, and from personal interviews with criminals and police officials." It is difficult, indeed, to imagine where else such material might be derived, but, on the other hand, one wonders exactly how accurate such sources may be. The general reader, however, need not worry, for he has before him a



work of immense interest whether the multifarious details of skull-cracking, blood-letting and general devilishness be minutely exact or not.

Mr. Asbury's purpose is "to chronicle the more spectacular exploits of the refractory citizen who was a dangerous nuisance in New York for almost a hundred years, with a sufficient indication of his background of vice, poverty, and political corruption to make him understandable." This task the author has, I believe, successfully carried out; he has worked with tremendous zest and relish, drawing a picture that is inconceivably harsh and realistic. It seems a wonder that any decent person managed to live in post-Civil War New York; I am sure that enough murders and clubbings are chronicled to have reduced considerably the population of that metropolis. Such notorious characters as Monk Eastman, Louie the Lump, Gyp the Blood, Paul Kelly, Humpty Jackson, Baboon Connolly, Billy McGlory, Eat 'Em Up Jack McManus, and many more with equally descriptive cognomens, strut through the book loaded down with revolvers, slungshots, and brass knuckles. We are introduced to such charming hostesses as Gallus Mag, who bit the ears off her refractory customers. We meet such aristocratic ladies as the Seven Sisters, who admitted no gentlemen into their establishments unless they were clothed in formal evening dress. We travel the Bowery and Paradise Alley with the Plug Uglies, the Bowery Boys, the Whyos, the Gas House Gang, the Gophers and a host of others. We read the details of the Becker-Rosenthal murder case, the Stewart body snatching episode, and what is known of the disappearance of little Charlie Ross. Either scholar or layman may spend a happy, horror-filled evening with this volume in his hands.

The book contains a glossary of gangster terminology. It is well indexed.

DOUGLAS L. HUNT.

SOROKIN, PITIRIM. *Contemporary Sociological Theories*. Pp. xxiii, 785. New York: Harper & Brothers, 1928.

There is an ominous sentence—ominous as coming from the author of a volume on

social theories—in the introduction to this book. "In the opinion of the writer," says Professor Sorokin, "the primary task of the scholar is to deal with facts rather than theories." It contains the popular pragmatic notion that there is something almost illicit about theorizing, that facts are hard realities waiting our discovery while theories are the products of our minds in some way divorced from the real world, that there is in short some deep opposition between facts and theories. It implies a weakness in the fundamental logic of the author and a rather naïve conception of the business of science, as though it could get along much better if people didn't spin theories "about" facts. It fails, in a manner which the body of the work reveals, to recognize the pertinent truth that the formation and verification of valid theories is the primary distinction of the scientist, that which sets him apart from the man in the street, and that all the great advances in sciences are the result of disciplined speculation, in short of successful theorizing.

Professor Sorokin's pragmatic impatience of his own subject-matter has some unfortunate results. There is a peculiar lack of balance and proportion in his treatment. His want of sympathy for theory leads him to omit all consideration of sociological thinkers like Oppenheimer or Müller-Lyer. There is no reference to the more important works of Hobhouse, which he would probably dismiss as a kind of metaphysics, while he devotes many pages to trumpery writers like Winiarsky. He practically ignores the whole range of evolutionary theories of society, contenting himself with a cheap sneer at their exponents (p. 369). Nor does he deal with the larger thought-movements of nationalism, socialism, and so forth, although even the author must admit that these are active forces of immense practical significance and not the "mere" theories of which he is so contemptuous.

At the same time there is much of value in the comprehensive work which Professor Sorokin offers. His work is critical as well as descriptive of the various sociological schools of the present and the near past, and often his criticisms are trenchant and effective. His knowledge of European as

well as American sociology is exhaustively drawn upon. Many American students of the subject are unaware of the great development of the social sciences which is taking place in European countries, and no work produced in America is so well calculated to reveal its extent as the volume before us.

R. M. MACIVER.

SIEGFRIED, ANDRÉ. *America Comes of Age*. Pp. 358. Translated from the French by H. H. Hemming and Doris Hemming. New York: Harcourt, Brace and Company, 1927.

The writer of this volume is a French professor who has traveled extensively in the United States and who has devoted his life to the teaching and studying of economics. Although by no means entirely unprejudiced, Professor Siegfried analyzes the present status of our American civilization with a frankness and a vigor that at once arrests our attention and challenges our thinking. The presentation of the subject matter divides itself into three parts: an examination of the ethnic situation; an analysis of the economic situation; a review of the political situation. A concluding chapter contrasts European and American civilizations. The author, with truly remarkable penetration for a foreigner interpreting America, discusses in realistic fashion our racial origins, religion, prohibition, immigration, freedom of thought, labor problems, industrial methods, foreign loans, world trade, parties and politics. While Professor Siegfried displays a marked animus towards all things American, and towards our Protestantism and our materialism in particular, nevertheless, his appraisal of our culture gives us food for thought and may at least make us pause to consider the future of our civilization. Our industrial mass production has absorbed the individual for its material conquests. With material advantages so great, with security so perfect, with enthusiasm of collective action in accomplishing stupendous tasks so overwhelming, can the individual possibly survive? In our enthusiasm to perfect our material success, the author believes that we have risked quenching the flame of individual

liberty. He wonders and almost doubts whether this unprecedented abundance of wealth in the long run will lead us to a higher form of civilization.

MARTIN L. FAUST.

LEWIS, EDWARD R. *America, Nation or Confusion*. Pp. xvi, 408. Price, \$3.50. New York: Harper & Brothers, 1928.

Mr. Lewis has given us a fervent defense of the national origins provision of the quota immigration law of 1924, based on the assumption that racial and cultural purity are essential for national stability and progress. He insistently disavows any belief in the superiority of the native American stock and institutions over the South European, but is positive that there are differences which will result in utter confusion if the immigrant tide is not checked by the 1924 act. In short, he is much afraid of hyphenated Americans. The evidence offered in support of his thesis includes a few tables of census and other well-known statistics, some generalized history, and a lot of opinions and quotations from Congressmen, captains of industry, financiers, popular writers, a few scientific and quasi-scientific students of population and many others too numerous to classify, all put together with the obvious purpose of proving a previously accepted point.

The foreword expresses appreciation of the criticisms and encouragement given by John B. Trevor, Francis H. Kinnicutt, Madison Grant, Kenneth L. Roberts and others, but the others mentioned do not include any of the great number of careful students of immigration who differ seriously from the school typified by Madison Grant.

There is much of scientific worth to be said in defense of the national origins and quota provisions which Mr. Lewis holds so dear, but he has said little of it.

DONALD YOUNG.

GAY, H. NELSON. *Strenuous Italy*. Pp. xii, 217. Price, \$3.00. New York: Houghton Mifflin Co., 1927.

The author of this book is an American, who has for many years lived in Rome and who speaks with the authority of one who has evidently devoted himself to the study

of Italian economic and political life. His book, in fact, is a survey of certain phases of Italy's cultural history of the last half century. Clearly and concisely he describes the great political awakening, the struggles for unification, the development of public health activities, the rise of a public school system and the effects of the industrial renaissance.

The important part of the book, however, is the discussion of the population problem, created by a high genetic growth and a limited territory. Here the author grows more circumspect. Emigration, he says, might appear as one solution of the difficulty. But no. "Fascism does not intend to encourage an emigration which diminishes the strength of the race and of the State" and which, in the words of the Duce, transfuses itself into red corpuscles to "invigorate anemic foreign countries." As for birth control, it is out of the question. It would be "suicidal as a national policy." Besides, the Duce has prohibited such propaganda and has imposed taxes on celibates and has threatened to do the same with sterile marriages. The policy of the State has, in addition, a powerful ally in the Church, which discountenances the teachings of birth control. To the student of social problems, it may seem paradoxical that such an interest in the maintenance of a high birth rate should go hand in hand with a desire to industrialize, and thus urbanize, Italy to improve her educational facilities, and to emancipate her women.

These two solutions rejected, there is but one left—territorial expansion. "A courageous country seeks to lessen its demographic pressure, not by weakening and numerically reducing its population, but by finding a healthy place under the sun for the demographic increase. Italy is looking for such a place." The author testily asks the neo-Malthusians to help find it instead of making "scientific suggestions." He even appeals to the workers of the world to assist in this search out of gratitude to a government which has so successfully solved the conflicts between capital and labor. He does not suggest any specific spot so long as it is rich in natural resources and capable of rapid development. He hopes to get it without war for

the same reason which the Duce gave in speaking of the coming revision of the mandates by the League of Nations, "I think there should be enough intelligent people (among the nations) for room to be made in time and with good grace, for this is the way to protect peace and make it just and lasting. It is not possible to condemn a people like the Italian people to vegetate. I believe that the States with which Italy was allied in the Great War will come to see that Italy's legitimate claims must be met. In any case, it should be clearly understood that nothing should be given to any one until the Italian share has been satisfied." Mr. Gay is frank to state that he observes certain obstacles in the way of this peaceful conquest, the most serious being that "there is no habitable spot on the face of the globe upon which Italy can cast an eye, without being aware that, in desiring it, she is coveting what is already the property of some other nation."

Scattered through the book are signs of the author's admiration for the present leadership in Italy. We are told that the Fascists were responsible for the return of prosperity. The full dinner pail! We learn that the fasci were originally formed as "a reaction for law and order, for civic liberty," and that the party has successfully solved the problem of labor versus capital. There is no reference to the early revolutionary program, which in itself disproves the author's statement as to the origin of fascismo, no mention of the "strenuous" campaigns against a free press and independent thought, no word about the thousands held in prison for being political dissenters, and no whisper about the terroristic tactics by which the opposition is controlled in these years of peace.

THORSTEN SELLIN.

EPSTEIN, RALPH C. *The Automobile Industry*. Pp. xviii, 412. Chicago: A. W. Shaw Company, 1928.

SELTZER, LAWRENCE H. *A financial History of the American Automobile Industry*. Pp. xxi, 297. Boston: Houghton Mifflin Company, 1928.

The automobile industry offers a splendid field for research. Its mere size challenges

attention, for with a capital investment of \$2,000,000,000, a labor force of 375,000, and an output valued at \$4,000,000,000 it stands near the top of manufacturing industries, while its phenomenal growth from a workshop industry turning out 5,000 crude horseless carriages in 1899, to a highly integrated industry producing almost 4,500,000 cars and trucks in 1926, ranks it as the industrial romance of the age.

Impressed by its size and rapid development, Professor Seltzer wants to know how the industry secured the necessary productive resources, and how its growth was financed. In the early days requirements were small, for manufacture was really "assembly." The bulk of fixed capital was obtained by diverting to the auto industry, plant and equipment, already in use in the sewing machine, bicycle, carriage and wagon industries, while working capital was derived largely from parts makers and dealers. The purchase of parts made to order minimized wage requirements. Extension of credit by parts makers and completion of assembly before payment was due, together with cash deposits of 20 per cent on all orders and full payment on delivery to dealers created a revolving fund that made resort to banks unnecessary.

Actual growth in capital resources has been due to reinvested profits. It is well known that the Ford Motor Company started in 1903 with an investment of \$28,000 and grew to a net worth of almost three-quarters of a billion in 1927, without resort to banks or the public, but it is seldom realized that this differs from other successful concerns only in degree. At the end of 1926 practically 80 per cent of the invested capital of the eight leading producers had been derived from reinvested profits.

Such growth was possible, of course, only through enormous earnings. Stated as a ratio to net worth, profits of the Ford Company have been as high as 377 per cent, and for eight years in succession exceeded 100 per cent; General Motors' earnings have risen as high as 94 per cent and have exceeded 35 per cent seven times. Hudson has exceeded 30 per cent eleven times between 1910 and 1926, and Nash fell below 27 per cent only twice from 1917 to 1926.

An interest in these financial problems is not necessary for the enjoyment of Professor Seltzer's book. He discusses in detail the development of the industry as a whole, gives a complete history of the General Motors Corporation and the Ford Motor Company, and sketches briefly the history of six other producers, and does it with such skill as to make an absorbing story.

Professor Epstein's study is broader in scope and concerned with trends in the industry rather than problems of individual producers. After stating the relation of the automobile to railroad transportation and noting its effect on rural life, consolidation of schools, urban congestion, the good roads movement, etc., he traces the development of the industry. Mass production with progressive assembly and the conveyor system is found to rest on (1) standardization and interchangeability of parts, and (2) perfection of machine tools. The various methods of market distribution are described and evaluated, the history of the Selden patent dispute is recounted and the present pooling of patents explained.

There are a number of points of interest for the economic theorist. Is competition effective? If so, why did it take "about a decade for the average earnings of . . . successful firms to fall much below 35 per cent?" How rapidly are innovations—balloon tires, four-wheel brakes, self starters,—of the leaders adopted by competitors? Are profits to be explained on the basis of the "rent" or the conjuncture theory? How account for the fact that of the 181 firms that engaged in the manufacture of autos from 1903 to 1926 139 have retired. Is production to be more highly concentrated, and are we approaching a condition of monopoly? Prices have been reduced about 85 per cent since 1904; is it due to external or internal economies?

Not all the conclusions can be given, but the following may be noted. "Monopoly . . . is almost unthinkable" (p. 222). "There is . . . no such thing as the 'representative firm' depicted in economic theory" (p. 207). And of leadership "mediocrity, once surmounted, is soon reverted to; incompetence surmounted is also soon reverted to; but leadership, once lost, is hardly ever seized again" (p. 200).



Both books are written in an entertaining style and constitute real contributions to economic literature.

C. P. WHITE.

GOLDER, FRANK ALFRED. *Documents of Russian History, 1914-1917*. Pp. 663. Price, \$4.00. New York: Century, 1927.

Students of the Russian experiment have found it difficult to make their way on even keel between the Scylla and Charybdis of cons and pros. Obstacles to adequate observation by travel, coupled with the language difficulty, have kept many from the field. The publication of these documents is thus trebly welcome.

Although the whole period from before the outbreak of the war to the setting up of the Soviet régime is covered, the bulk of the material comes only from the year of revolution itself. The purpose in selection has obviously been to depict the immediate background of the Bolshevik movement. But this selection includes not merely politico-military antecedents. Many of the documents are concerned with economic conditions, and social and intellectual elements are not neglected. And the sources are of many sorts: diaries, despatches, edicts, editorials, proclamations and declamations.

With brief chapter introductions the documents are otherwise allowed, or compelled, to tell their own story. One might have wished, for the sake of the average reader, that many of these documents had had notes, however brief, to place them in their setting, and give some coherence to the story they tell. The period was one of surging emotions and subtle propaganda and counter-propaganda. The documents

have to present both the emotions of the original author and the acts which he wishes to present. Without some assistance the reader is liable to get the one and miss the other.

But the book is to be commended. The format is attractive. Most of the translations are by Emanuel Aronsberg and are adequate. The book maintains no thesis, but the continuity might have been greater had the arrangement of documents been more logical. Book one, on the Old Régime, is arranged topically; book two, on the New Régime, is arranged chronologically. But there is a detailed table of contents.

It is to be hoped that Professor Golder may be able to follow up this work with one treating of the Bolshevik period itself, and for this his long-standing interest in Russian history and his obvious impartiality would seem to fit him.

WILLIAM WHITELAW.

CARR-SAUNDERS, A. M., and JAMES D. CARADOG. *A Survey of the Social Structure of England and Wales*. Pp. xv, 246. New York: Oxford University Press, American Branch.

Contains statistics on population: age, sex, marriage, housing, distribution, classification by industry, classification by occupation, industrial status and social class; occupational associations; national income; national wealth; education; entrance into occupations; state and voluntary provisions against misfortune; compulsory and voluntary transfer from rich to poor; poverty; crime; inborn qualities; and the recruitment of the population.



## INDEX

Accounting Plan, approving and adoption of, 76.  
 Accounting Systems, benefits of uniformity, 79.  
 Accounting, uniform system, 75.  
 Accounts, Manual of, 77.  
 Act, Workmen's Compensation, 179.  
 Advertising, 109.  
 Advertising and Sales Effort, 106.  
 American Petroleum Institute, 92.  
 Analyses, qualitative, 154, 155; effect of, 155.  
 Anti-Trust Laws, 48, 98; violation of, 42, 43.  
 ASSOCIATIONS, THE PRESENT LEGAL STATUS OF  
     OPEN PRICE, Franklin D. Jones, 34-7.  
 Automobile Industry, expansion of, 164; equal-  
     ized production in, 160.  
  
 Bank Deposits, increase in, 162.  
 Banker, influence over industry and trade, 152;  
     aim of, 152.  
 Bankers, general functions, 153.  
 Bankers' Limited Power, 152, 153; clientele, 152,  
     153.  
 Bankers' Loanable Funds, supply of, 156.  
 Bankers, strategic position for guiding produc-  
     tion, 152.  
 Banking System, improved, 158.  
 Banks, Commercial, purpose of, 153.  
 Banks, Credit resources, 156.  
 Banks, Reserve, 156, 157; Correspondent, 156;  
     Commercial, 157.  
 BELL, J. W., The Role of the Banker in Guiding  
     Production, 152-9.  
 BELLER, E. L. Economic Effect of Simplifica-  
     tion in the Paving Brick Industry, 71-3.  
 Bituminous Coal, production of, 101.  
 Bonds, Municipal County, 175.  
 Budgetary Control, 78.  
 Building Permits, 175.  
 Bureau of Business Research, 142.  
 Bureau of Census, 65, 66, 67, 184.  
 Bureau of Economic Research, National, 116.  
 Business Conditions, knowledge of, 38.  
 Business Currents, changing, 114.  
 Business Cycle, 120, 160, 165; effects of instal-  
     ment credit, 161, 163.  
 Business Cycles, committee on, 69.  
 Business Data, increase in, 110.  
 Business Depression, cause of, 163, 164.  
 Business Fluctuations, 111.  
 Business Forecasting, accuracy of, 200; unre-  
     liability of, 199.  
 Business Forecasts, 200.  
 Business Gains, 130; Standardization and quan-  
     tity production, 130.  
 Business Instability, 143.  
 Business Movements, long-time trends, 170.  
 Business, recession in, 161.

Business Research, bureau of, 142.  
 Business Statistics, 111.  
 Buying Policy, changes in transportation situa-  
     tion, 138, 139.  
 Buying Practices, causes and influences, 137.  
 Buying, small or repeat orders, effects of, 143,  
     144; analyzation of, 144.  
  
 CAUSES AND EXTENT OF PRICE FLUCTUATIONS,  
     THE, Charles P. White, 7-14.  
 Cement Association Case, 47, 50.  
 Cement and Maple Flooring Decisions, 40.  
 Census, Bureau of, 58.  
 Census of Manufacturers, Biennial, 51; useful-  
     ness of results, 52.  
 CHANGES DUE TO CHEMISTRY, Edward R.  
     Weidlein, 15-33.  
 Checking Accounts, 154.  
 Chemical Research, Products from Petroleum,  
     30.  
 Chemical Technology, 19.  
 Chemistry and Cottonseed Industry, 30, 31;  
     Sugar and Corn Products Industry, 30, 31.  
 Chemistry, importance in industry, 26, 27; in  
     the Portland Cement Industry, 26, 27.  
 Chemistry, importance of, 19; attitude toward,  
     24.  
 Chemistry in Agriculture, 29, 30.  
 Chemistry in Aviation, 29.  
 Chemistry, Industrial, 16.  
 CHEMISTRY, INDUSTRIAL CHANGES DUE TO,  
     Edward R. Weidlein, 15-33.  
 Chemistry in Industry, 20; discoveries, 20, 21.  
 Chemistry in Paper and Leather Industry, 31.  
 Chemistry in Textile Technology, 31, 32;  
     Indigo, 32; Dyes, 32; Rayon, 32.  
 Chemistry in the Electrical Industries, 28, 29;  
     X-Ray, 29.  
 Chemistry in the Food-Packing Industry, 28.  
 Chemistry, introduction of, in Steel Making,  
     24, 25.  
 Chemistry and Refrigeration, 28.  
 Chemistry, Theory and Practice of, 18.  
 Chemistry, use of metals, 26.  
 Chemists, American, 18, 19.  
 Codes of Ethics, 74.  
 Commercial Banks, advances of, 154.  
 Commodities, organized speculation in, 149;  
     demand for, 9.  
 Commodities, Variations by groups of, 10.  
 Commodity Price Movements, 168.  
 COMMODITY PRICE STABILIZATION AS A PROBLEM  
     OF INSURANCE, G. Wright Hoffman, 146-51.  
 Commodity Prices, 167.  
 COMMODITY PRICES TO THE PRICE LEVEL, RE-  
     LATION OF, Amos E. Taylor, 166-73.

- Compensation Laws, 47.  
 Competition, 75; problems of, 163, 172; conditions in, 153; waste of, 128; effect on, 75, 77.  
 Competition, restraint upon, 47; prevention of, 49; unfair, 41, 42.  
 COMPETITION, THE RELATION OF UNIFORM POST ACCOUNTING TO, C. W. Halligan, 174-79.  
 Competition Bidding, 162.  
 Concentration of Orders, 103, 104.  
 Concerted Action, 37, 39, 40, 41, 42, 43.  
 Concerted Action, limitations of, 35; problem of Supreme Court, 35.  
 Conservatism, Period of, 137.  
 Construction Cost, 178.  
 Construction Costs and Interest Rates on Municipal Bonds, 186-8.  
 Construction Index, 123.  
 Construction Industry, Activity of, 175.  
 Construction Price, 208.  
 Construction Trades, Influx of Workers, 208.  
 Consumption, Motives on which based, 126, 127.  
 Contract Price, 187.  
 Contracts Let, 176, 203; values of, 191, 199.  
 Contracts, price of, 175.  
 Coöperative Agreements, legality of, 91, 92.  
 Coöperative Agreements, voluntary, 97, 98; objections to, 97.  
 Cost Accounting, Development of a Uniform System, 74, 75.  
 Cost Accounting, need for uniformity, 77, 78.  
 Cost Accounting, uniformity of, 74; benefits of, 74.  
 COST ACCOUNTING TO COMPETITION, THE RELATION OF UNIFORMITY, C. W. Halligan, 74-9.  
 Cost Comparisons, 76.  
 Cost, Factory, 75.  
 Cost Index, 194.  
 Cost of Construction, 188.  
 Cost of Production, 74.  
 Cost System, Uniform, 76.  
 Costs, Unit, increase of, 160.  
 Credit, Bank, 162, 163; Personal, 162; Instalment, 162, 163; Factors of, 170.  
 Credit Conditions, 161.  
 Credit Control, objects of, 171.  
 Credit, Control of by Federal Reserve Banks, 170, 171.  
 Credit, Control of the volume of, 157.  
 Credit, Directing the use of, 154.  
 Credit Expansion, Commercial banks, 157.  
 Credit Expansion, control of, 163.  
 Credit, extension of, 160, 162, 164; operation of, 161.  
 Credit Inflation, action taken, 155, 156.  
 Credit, Instalment, restriction of, 165.  
 Credit, price of, 157; controlling use of, 158; principles of, 158.  
 Credit Resources of Banks, 156.  
 Credit, supply of, 156.  
 Credit System, organization of, 166.  
 Credit Tests, quantitative, 154.  
 Credit Transactions, 152.  
 Credits, Short-time, 168.  
 Crude Petroleum, proration of production, 92; effect of control of production, 92, 93; production of, 95.  
 Crude Petroleum, 87; storage of, 87; domestic, 87; imported, 87; price conditions, 88, 90.  
 Current Statistics, publication of, 66.  
 Curve of Sales, 120, 121.  
 Cyclical Fluctuations, 13.  
 CYCLICAL UNEMPLOYMENT, PUBLIC CONSTRUCTION AND, F. G. Dickinson, 175-209.  
 Cyclical Variability, index of, 13.  
 Dealers, 49.  
 Debt Restrictions, 208.  
 Deflation, evidences of, 168.  
 Demand in the Automobile Industry, following the, 132.  
 Demand, guidance of, 134; Advertising, 134; "Decoy" style announcers, 135.  
 Demand, Guidance of by reduction of style, 133, 134; need of, 134; Kalamazoo Stove Company, 134.  
 Demand, uniformity of, 106.  
 Demand and Supply, 45.  
 DEVELOPMENTS IN TRADE ASSOCIATION LAW, Gilbert H. Montague, 38-43.  
 DICKINSON, F. G., Public Construction and Cyclical Unemployment, 175-209.  
 DODGE CORPORATION, F. W., report of, 176.  
 ECONOMIC EFFECT OF SIMPLIFICATION IN THE PAVING BRICK INDUSTRY, E. L. Beller, 71-3.  
 Economic Research, National Bureau of, 116.  
 Economic Risk, 146.  
 EFFECT OF SIMPLIFICATION IN THE PAVING BRICK INDUSTRY, ECONOMIC, E. L. Beller, 71-3.  
 EFFECTS OF INSTALMENT SELLING ON STABILITY, THE, Wilbur C. Plummer, 160-5.  
 Efficiency, productive, 204.  
 Electro-Chemical Industry, founding of, 26.  
 Employment, fluctuations in, 178, 199; stabilization of, 203.  
 Employment Index, 123, 207; Federal Reserve Board, 182; New York Industrial Commission, 184.  
 Employment in Manufacturing Industries, 178.  
 Employment, redistribution of, 208.  
 Employment, regularization of, 104.  
 Employment Statistics, State Factory, 179.  
 Engineering News-Record, 191; Report of, 177.  
 Engineering News-Record Construction Cost Index Number, 186, 187.  
 Engineering News-Record Data, 176, 177.  
 Essentials of Life, providing for, 126.  
 Ethics, Code of, 40, 41.  
 Expenses, Administrative and Selling, 75; control of, 75.

EXTENT OF PRICE FLUCTUATIONS, THE CAUSES  
AND, Charles P. White, 7-14.

Factory Employment, fluctuations in, 191.  
Factory Laborer, problems of, 206.  
Factory Wage Bill, 184; estimate of, 185, 186.  
Factory Wages, amount of, 207.  
Federal Oil Conservation Board, 99.  
Federal Reserve Bank Practice, 157.  
Federal Reserve Banking Policy, 172.  
Federal Reserve Banks, controlling the credit situation, 165, 170, 171.  
Federal Reserve Banks, credit policy, 172, 173.  
Federal Reserve Board, index of, 182.  
Federal Reserve Policy, 157.  
Federal Reserve System, 110, 156.  
Federal Trade Commission, 92; policy of, 42.  
Federal Trade Commission Act, 42.  
Finance Company, 162; function of, 160.  
Financial Statements, 154.  
Financing, methods of, 203.  
Financing Public Improvements, 188.  
Fluctuations, Cyclical and Accidental, 111.  
Fluctuations in Orders, 104.  
Fluctuations in Production, effects of, 102.  
Fluctuations in Productive Operations, 44; in prices, 44.  
Fluctuations of Business, 165.  
Food Products, demand for, 8, 9.  
Forecasters, Mechanical, search for, 115.  
Forecasting, accurate, 125.  
Forecasting, classification of, 113.  
Forecasting Curves, 115, 116; failures, 116.  
Forecasting Demand, 144.  
Forecasting Index, 120.  
FORECASTING, INDUSTRIAL, Charles P. White, 109-125.  
Forecasting, objectives in, 113, 114.  
Forecasting, of demand and of prices, 147.  
Forecasting, results of, 117, 118; Work of Disston Company, 118; Work of Thomas A. Edison, Inc., 118; Work of Graybar Company, 119; Work of Eastman Kodak Company, 119; Work of Walworth Company, 120.  
Forecasting, Short-term, 123, 124.  
Forecasting, success of, 121.  
Gas, Conservation of, 98.  
GUIDING PRODUCTION, THE RÔLE OF THE  
BANKER IN, J. W. Bell, 152-159.  
Gompertz Curve, 111.  
HALLIGAN, C. W., The Relation of Uniform Cost Accounting to Competition, 74-9.  
HAND-TO-MOUTH BUYING, Charles P. White, 136-45.  
Hand-to-Mouth Buying, causes of, 136; advantages of, 139; extent of practice, 139.  
Hand-to-Mouth Buying, effect on production and price, 144; stabilizing influence, 145; analzyation of market, 145.

Hardware Association, National Retail, 58.  
Harvard Business Curve, 120.  
Harvard Group, work of, 113.  
HOFFMAN, G. WRIGHT, Commodity Price Stabilization As a Problem of Insurance, 146-51.  
HOWARD, THOMAS W., The Statistical Work of Trade Associations, 51-63.  
Index, Forecasting, 120; Construction, 123.  
Index Numbers, 4, 166.  
Index Numbers, Monthly, 67, 68.  
Index of Employment, 206; requirements of, 179, 180; application of, 181; fluctuations from, 206.  
Index of Factory Employment, 188, 189.  
Index of Factory Payrolls, 188, 189, 196.  
Index of Federal Reserve Board, 182, 183, 184.  
Index of General Business, 122.  
Index of Pay-Roll Totals, 182.  
Index of Sales, Construction of, 114, 116, 117.  
Index, Snyder's, 120.  
Indices, Manufacturing, 68; raw material, 68; Stocks and unfilled orders, 68.  
Indices of Cost, 186.  
Indices, employment and payroll, merits of, 184; effectiveness of, 184.  
INDUSTRIAL CHANGES DUE TO CHEMISTRY, Edward R. Weidlein, 15-33.  
Industrial Coöperation, need for, 74.  
INDUSTRIAL FORECASTING, Charles P. White, 109-25.  
Industrial Forecasting, present practice, 117.  
Industrial Forecasting, results of, 117, 118; Work of Disston Company, 118; Work of Thomas Edison, Inc., 118; Work of Graybar Company, 119; Work of Eastman Kodak Company, 119; Work of Walworth Company, 120.  
Industrial Institute, Economic Justification, 49.  
Industrial Institutes, establishment of, 48.  
Industrial Problems, 109.  
Industrial Research, in progress, 32.  
Industrial Savings, 121, 122.  
Industrial Waste, elimination of, 71.  
Industrial Water Problems, 27.  
Industrialization, effects of, 126.  
Industry, Nationalization of, 97.  
Inflation, spirit of, 156; evidences of, 168.  
Instability, 169; cause of, 164.  
Instability in Business, 143.  
Instalment Buying, 163; Periods of Depression and Recovery, 164.  
Instalment Contracts, clauses in, 164.  
Instalment Credit, restriction of, 165.  
Instalment Credit and Prosperity, 162.  
Instalment Sales, 162.  
Instalment Selling, effects of, 100; expansion of, 165.  
Instalment Selling and Over-Production, 163.  
INSTALMENT SELLING ON STABILITY, THE EFFECTS OF, Wilbur C. Plummer, 160-5.

- Instalment System, development of, 161.  
 Institute of Economics, Interest in Small Orders, 140.  
 INSURANCE, COMMODITY PRICE STABILIZATION AS A PROBLEM OF, G. Wright Hoffman, 146-51.  
 Insurance, Contract of Land Value, 149.  
 Interest Rates on Municipal Bonds, Construction Costs and, 186-8.  
 Inventories, decrease in, 140; Pennsylvania Railroad, 140; American Railway Association, 140; United Gas Improvement Company, 140; Bethlehem Steel Corporation, 141; Packard Motor Company, 141; Johnson Cowden Corporation, 141; A. W. Shaw Company, 141.  
 Inventories, speculation in, 172.  
 Inventory Values, inflation of, 75.  
 Investment Institutions, purpose of, 152.  
  
 JONES, FRANKLIN D., The Present Legal Status of Open Price Associations, 34-7.  
  
 Labor and Materials, weighing of, 187.  
 Labor, Mobility of, 208.  
 Labor Shortage, 109.  
 Labor Turnover, 102, 107.  
 LANE, MORTIMER B., The Statistical Work of the Federal Government in Relation to Price Stabilization, 64-70.  
 LAW, RECENT DEVELOPMENTS IN TRADE ASSOCIATION, Gilbert H. Montague, 38-43.  
 Laws, economic, 39.  
 LEGAL STATUS OF OPEN PRICE ASSOCIATIONS, THE PRESENT, Franklin D. Jones, 34-7.  
 Linseed Oil Case, 35, 36.  
 Liquidation, demands for, 162.  
 Loanable Funds, supply of, 156.  
 Loans, 153, 154; amount of, 155; personal or character, 154; long-time, 154.  
  
 Management Problems, study of, 123.  
 Management, Scientific, development of, 110.  
 Manufacturing Purchasers, 49, 50.  
 Maple Flooring Case, 35, 36, 47, 49, 61, 62.  
 Maple Flooring and Cement Decisions, 40.  
 Maple Flooring Manufacturers' Association, 51, 61.  
 Market Changes, 44, 45.  
 Market Operations, open, 170, 171.  
 Marketing Policies, 47.  
 Market Price of Commodities, assuming the risk of change, 150.  
 Market Purchases, 157.  
 Market Stability, 46.  
 Marketing Methods, 105; exports, 105.  
 Material Costs, 109.  
 MEANING OF STABILITY, THE, Charles P. White, 1-6.  
 Merchandising Campaigns, 109.  
 Merchandising Policies, 106; Price Reductions, 106.  
  
 Metallurgical Industries, 26.  
 Metallurgy, 16, 26; Accomplishments in, 24; of iron, 24; other achievements, 25.  
 Mid-Continent Oil and Gas Association, Meeting of, 93.  
 Monopoly, 14.  
 MONTAGUE, GILBERT H., Recent Developments in Trade Association Law, 38-43.  
 Municipal Bonds, Construction Cost and Interest Rates on, 186-8.  
 Municipal Bonds, 175; fluctuations in rates of interest, 196, 197, 199.  
 Municipal Bonds, 202; selling price, 207.  
 MYERS, ABRAM F., Present Plans for Stabilizing the Oil Industry, 87-99.  
  
 National Bureau of Economic Research, estimate of, 146.  
 Natural Gas, waste of, 85.  
 News Print Service Bureau, 76.  
  
 Oil, Causes of overproduction, 80, 81; Method of pumping, 81; Leases, 81.  
 Oil Conservation, 91; Need for legal advice, 95, 96.  
 Oil Conservation Board, 85.  
 Oil, Control of imports, 86.  
 Oil, Coöperative Development, 96, 97.  
 Oil, Curtailment of Domestic Production, 91.  
 Oil Districts, 97.  
 Oil Field, Coöperative development and operation, 98.  
 Oil, Government Leases and Overproduction, 81, 82.  
 Oil Industry, control in, 87.  
 Oil Industry, history of, 87.  
 OIL INDUSTRY, PRESENT PLANS FOR STABILIZING THE, Abram F. Myers, 87-99.  
 Oil, over-production of, 80-4.  
 Oil, Plans for Permanent Stabilization, 84; difficulties, 84, 85.  
 Oil, Price Conditions, 88.  
 Oil Production, curtailment of, 94.  
 Oil, Property in, 87.  
 Oil, Restraints on Competition, 98.  
 Oil, Seminole Plan, 82, 83; Restriction on Production, 83, 84; effects, 83.  
 Oil, Seminole Pool, 80.  
 Oil, Stabilization of Production, 81, 85; unit development, 85; plan submitted, 85.  
 Oil, Supply and Demand, 88.  
 Oil, Waste of, 96.  
 Open Price Association, 34; meaning of, 34; statistical data, 36.  
 Open Price Association, principle established by Supreme Court, 34; Hardwood Case, 34, 36; Linseed Oil Case, 34, 36; Maple Flooring Case, 35, 36.  
 Outlays, 175.

Overproduction, cause of, 163.  
Overproduction and Instalment Selling, 163.

Paving Brick, styles and sizes, 71, 72.

PAVING BRICK INDUSTRY, ECONOMIC EFFECT OF SIMPLIFICATION IN THE, E. L. Beller, 71-73.

Paving Brick Manufacturers and Consumers, conference of, 71.

Payroll Figures, Monthly, 178, 179.

Payroll Index, 207.

Payroll Totals, 178.

"Pearl-Reed" Curve, 111.

Petroleum, Production of, 87.

Petroleum Products, supply of, 88.

Plant Buildings and Machinery, depreciation of, 75.

Plummer, Wilbur C., The Effects of Instalment Selling on Stability, 160-5.

Policies, Business, control of, 69.

Population, concentration of, 127.

Portland Cement Industry, 26, 27.

Practice, Standards of, 154.

Prediction by Analogy, 113; by Formula, 113; by Analysis, 113.

PRESENT LEGAL STATUS OF OPEN PRICE ASSOCIATIONS, THE, Franklin D. Jones, 34-7.

PRESENT PLANS FOR STABILIZING THE OIL INDUSTRY, Abram F. Myers, 87-99.

Price Advances, 137.

Prices, Average Annual, 11.

Price Behavior, Analysis of, 169.

Price Change, 167, 168.

Price Changes, 5, 128; desirability of, 5; fear of, 104.

Price Changes, elimination of, 150; uncertainty of, 151.

Price Changes, forecasting, 148.

Price Changes, frequency of, 12, 13; risk of, 45.

Price Changes, reducing the risk of, 47.

Prices, Commodity, 167.

Price Competition, 4.

Price Cuts, 140.

Price, decrease in, 146, 149, 204.

Price Determining Factors, 167.

Prices, effects of changing factors on, 167.

Price Factors, 170.

Price Fluctuations, 2, 44, 46, 108, 128, 172; problem of, 1; effects of, 1; cause and extent of, 13; reduction of, 14.

Price Fluctuations, reduction of, 145.

PRICE FLUCTUATIONS, THE CAUSES AND EXTENT OF, Charles P. White, 7-14.

Price Fluctuations, 9, 10; year to year, 11; frequency of, 12.

Price Frequency, 169.

Price Hazard, 146; insuring the, 148, 149.

Price Hazard, meeting through hedging, 149, 150.

Price Index, 168, 170.

Price Insurance, outlook for, 150, 151.

Price Level, 2; decline in, 171; effects on, 68, 161, 163.

Price Level Analysis, 171.

Price Level, fluctuations in, 169; instability in, 170; influencing of, 172.

Price Level Movement, Economic Theory of, 2.

Price Level, movements of, 69, 70, 170; influencing factors, 170.

PRICE LEVEL, RELATION OF COMMODITY PRICES TO THE PRICE LEVEL, Amos E. Taylor, 166-73.

Price Level, rising, 162.

Price Level, 166, 168; stabilization of, 167, 170.

Price, Mechanism, 4.

Price Movements, 168; among Agriculture Groups, 172.

Price Protection, 149.

Price Recession, 169.

Price Reductions, 109.

Price Relations, disturbance in, 167, 168.

Price Relationships, 3, 4, 169; change in, 166, 167, 168.

Price Risks, 156; nature of, 146, 147; methods of meeting, 147; self-insurance, 147, 148.

Price Schedules, adjustment of, 168.

Price Situation, index numbers, 67, 68.

Price Stability, 45, 46.

Price Stabilization, 44, 45; problem of, 146.

PRICE STABILIZATION AS A PROBLEM OF INSURANCE, COMMODITY, G. Wright Hoffman, 146-151.

PRICE STABILIZATION IN OIL THROUGH CONTROL OF PRODUCTION, W. H. Voskuil, 80-86.

Price, Stabilization of, 5, 6, 9, 13, 39, 69, 167, 168; summary of, 6, 64, 167.

PRICE STABILIZATION, THE STATISTICAL WORK OF THE FEDERAL GOVERNMENT IN RELATION TO, Mortimer B. Lane, 64-70.

PRICE STABILIZATION THROUGH TRADE ORGANIZATION AND STATISTICAL COÖPERATION, Myron W. Watkins, 44-50.

Price System, 50, 166, 168, 169.

Price Trends, 55, 169; study of, 170.

Price Unit, 5.

Price Uncertainty, 146; elimination of, 148; meeting the problems of, 150.

Price Variability, 169.

Price Variations, 46, 47, 100; causes of, 100.

Prices, Market trend in, 147.

Prices, Stabilization of, 39, 64, 69, 103, 167, 168.

Prices, the Behavior of, 9.

Prices, trend of, 55.

Prices, unchanging, 4, 6.

Prices, variability of, 12; uniformity of, 38.

Primary Producer, 50.

Private Construction Items, 177.

PROBLEM OF SEASONAL VARIATION, THE, Charles P. White, 100-8.

Problems in Marketing, 133, 134.

Production, Coördination of, 65; diversification of, 107.



- Production Cost, reduction of, 107.  
 Production, costs of, 74; waste in, 204.  
 Production, effects of fluctuations in, 102; concentration of, 102; planning of, 102.  
 Production, equalized in the Automobile Industry, 160.  
 Production, misdirected, 163, 164; uncertainty of, 153.  
 PRODUCTION, PRICE STABILIZATION IN OIL THROUGH CONTROL OF, W. H. Voskuil, 80-6.  
 Production Schedules, 75.  
 Production, Stabilization of, 158, 156.  
 PRODUCTION, THE RÔLE OF THE BANKER IN GUIDING, J. W. Bell, 152-9.  
 Productive Operations, fluctuations in, 44.  
 Public Construction, allocation of, 207, 208.  
 PUBLIC CONSTRUCTION AND CYCLICAL UNEMPLOYMENT, F. G. Dickinson, 175-209.  
 Public Construction Appropriations, 205.  
 Public Construction, corrective influences, 200; corrective plans for, 202, 203.  
 Public Construction, data on, 176; dangers of, 204.  
 Public Construction, estimates for, 177.  
 Public Construction, expansion in, 202; effects of, 202; results of research, 207.  
 Public Construction Items, 177.  
 Public Construction, planning, 200.  
 Public Construction, quick action necessary, 201.  
 Public Construction, shifting of, 189-99.  
 Public Construction, shifting of, 207; effect of, 207.  
 Public Construction, the volume of, 175.  
 Public Construction, value of, 191; allocation of, 192, 196; cost of, 194; financing, 196.  
 Public Improvement, financing, 188.  
 Public Improvement, plans for, 206; abnormal expansion, 206.  
 Public Improvement Program, effect of politics on, 201.  
  
 Ratio Plotting, 121.  
 Ratios for Printing Management, 59.  
 Raw Materials, 143; purchase of, 123, 148.  
 RECENT DEVELOPMENTS IN TRADE ASSOCIATION LAW, Gilbert H. Montague, 38-42.  
 Rediscount Rates, 171, 172.  
 RELATION OF COMMODITY PRICES TO THE PRICE LEVEL, Amos E. Taylor, 166-73.  
 RELATION OF UNIFORM COST ACCOUNTING TO COMPETITION, THE, C. W. Halligan, 74-9.  
 Research, Industrial, 15, 16; development of, 24.  
 Research, Scientific, 15.  
 Research, Techno-Chemical, Initial Stage in America, 16, 17, 18.  
 Reserve Banks, 156, 157.  
 Reserve Ratio, 156.  
 RÔLE OF THE BANKER IN GUIDING PRODUCTION, THE, J. W. Bell, 152-9.  
  
 Sales, estimation of, 109; stimulation of, 164.  
  
 Salt Creek Consolidated Oil Company, report of, 92.  
 Science, Progress in Road Building, 27.  
 Scientific Management, development of, 110.  
 Seasonal Fluctuations, 160.  
 Seasonal Variations, 111, 119; elimination, 108, 114.  
 Seasonal Variations, remedies, 102, 103, 108.  
 SEASONAL VARIATION, THE PROBLEM OF, Charles P. White, 100-8.  
 Securities, investments in, 153; Commercial Bank, 154.  
 Self-Insurance, formulated plan, 148.  
 Sellers' Market for Materials and Labor, 162.  
 Seminole Oil Fields, decreasing production, 93; prorating of production, 93.  
 SHALL WE CONTROL DEMAND OR FOLLOW IT, Charles P. White, 126-35.  
 Sherman Anti-Trust Law, 39.  
 Shoe Industry, 102.  
 Simplification in Private Industry, effects of, 72; benefits of, 72.  
 SIMPLIFICATION IN THE PAVING BRICK INDUSTRY, ECONOMIC EFFECT OF, E. L. Beller, 71-3.  
 Simplification or Standardization of Goods, 133.  
 Simplified Practice, division of, 71; results of, 72, 73.  
 Snyder's Index, 120.  
 Specialization, 115; advent of in Printing, 160.  
 STABILITY, THE EFFECTS OF INSTALMENT SELLING ON, Wilbur C. Plummer, 160-65.  
 STABILITY, THE MEANING OF, Charles P. White, 1-9.  
 Stability, 4; with regard to Price Level, 4.  
 Stabilization, 87, 168; advantage of, 69.  
 STABILIZATION IN OIL THROUGH CONTROL OF PRODUCTION, PRICE, W. H. Voskuil, 80-6.  
 Stabilization, industrial, 51, 62; problem of, 44.  
 Stabilization of Business, 160.  
 Stabilization of Markets, 37, 44; of prices, 44; of output, 44.  
 Stabilization of Prices, 103, 157, 167, 168.  
 Stabilization of Production, 136, 157, 158, 207.  
 Stabilization of Trade Industry, 38.  
 STABILIZATION THROUGH TRADE ORGANIZATION AND STATISTICAL COÖPERATION, PRICE, Myron W. Watkins, 44-50.  
 STABILIZING THE OIL INDUSTRY, PRESENT PLANS FOR, Abram F. Myers, 87-99.  
 Standard Oil Company, statement of, 90, 91.  
 Standard Oil Trust, 87.  
 Standardization of Statistical Procedure of Trade Associations, 62.  
 Standards of Practice, 154.  
 Statistical Activities, Interesting the Business Executive, 60.  
 Statistical Activities, 57; Weekly Trade Barometer, 57; National Fertilizer Association, 57; Common Brick Industry, 57; Paper Industry, 57.

- STATISTICAL COÖPERATION, PRICE STABILIZATION THROUGH TRADE ORGANIZATION AND, Myron W. Watkins, 44-50.
- Statistical Facts, Character of, 52; utility of, 52, 55, 56.
- Statistical Procedure, 58; United Typotheta of America, 58, 59.
- Statistical Technique, development of, 111.
- STATISTICAL WORK OF THE FEDERAL GOVERNMENT IN RELATION TO PRICE STABILIZATION, THE, Mortimer B. Lane, 64-70.
- STATISTICAL WORK OF TRADE ASSOCIATIONS, THE, Thomas W. Howard, 51-63.
- Statistics, Current Business, How to use, 68, 69, 70.
- Statistics, distribution of, 69.
- Statistics, Evidences of Disinterest, 51, 52; usefulness of, 58.
- Statistics, financial of states and cities, 175.
- Statistics, Ratios for Printing Management, 59; Profit and loss statements, etc., 59.
- Statistics, Record Book of Business, 67.
- Statistics, requirements for, 65, 66; publication of, 66.
- Statistics, results of publication, 68, 69.
- Statistics, State Factory Employment, 179.
- Statistics, Summary of, 57, 58; American Paper and Pulp Association, 57, 59.
- Statistics, trade, 49.
- Statistics, Trade Association, 51.
- Statistics, United States Bureau of Labor, 179.
- Steel, manufacture of, 25, 26.
- Strong Bill, proposal of, 2.
- Style Changes, 137.
- Style Control, Automobile Industry, 132.
- Style, coöperative guidance, 128.
- Style, determination of, 127; methods of research, 128.
- Style Element, 145.
- Style, Factors tending toward greater control, 127, 128.
- Style Forecastings, accurate, 145.
- Style, meaning of, 126; causes of emphasis on, 126.
- Style Principles, increased knowledge of, 128.
- Style Problem, methods used in solving, 128, 129; Merchants and Manufacturers, 129; Human choice, 129.
- Style, Proposed Three-Phase System, 130.
- Style, "Service Stock" Idea, 130; in the Shoe Industry, 130, 131; Ispwich Mills Practice, 131; experience of Gotham Silk Hosiery Company, 131, 133.
- Style, stability in, 135.
- Styles, advantages in, 134; reduction of, 134.
- Styles, Principles governing the formation and development of, 128.
- Supplies, knowledge of, 38.
- Supply and Demand, 45, 154; factors of, 167.
- Survey of Current Business, 64, 65, 66, 67, 69; collection of figures, 66; publication of, 66, 67.
- TAYLOR, AMOS E., Relation of Commodity Prices to the Price Level, 166-73.
- Techno-Chemical Research, 1860-1880, 21; Advancement of Industry, 22; During the last half-century 22, 23, 24.
- Technology, Chemicals, awakening of, 19.
- Technology, 15, 16, 29; Metallurgy, 16.
- Trade Association, 74.
- Trade Association Activity, advantages of, 45.
- TRADE ASSOCIATION LAW, RECENT DEVELOPMENTS IN, Gilbert H. Montague, 38-43.
- Trade Association Law, Supreme Court on Competition, 38.
- Trade Associations, 40, 46, 47, 51, 56, 58.
- Trade Associations, 40; Code of Ethics, 40, 41; Statistical Work, 111.
- Trade Associations, Membership of, 65.
- Trade Associations, Difficulties, 61; Standardization of Statistical Procedure, 62.
- Trade Associations Statistical Movement, 60; General Conclusions, 62, 63; usefulness of, 63.
- TRADE ASSOCIATIONS, THE STATISTICAL WORK OF, Thomas W. Howard, 51-63.
- Trade Associations, utility of trade statistics, 60.
- Trade Coöperation, 47, 49, 50.
- Trade Coöperation for the Stabilization of Prices, 50.
- TRADE ORGANIZATION AND STATISTICAL CO-OPERATION, PRICE STABILIZATION THROUGH, Myron W. Watkins, 44-50.
- Trade Organization, New Development in, 49.
- Trade Practices, 40; attempts to control, 40.
- Trade Practices, uniform, 3.
- Trade, restraints, of 97.
- Trade Statistics, 49, 62; compilation and distribution of, 49.
- Trade Union Coöperation, 208.
- Trade Unions, members of, 178.
- Trade Unions, restriction of membership, 205; increasing membership, 205, 206.
- Transportation Situation, 138.
- Turnover, Elimination of unnecessary duplications, 143.
- Turnover, increasing rate of, 141, 142; change in merchandising policy, 142; severity of competition, 142.
- Unemployment, committee on, 69; data on, 178.
- Unemployment, objections to remedy, 204, 205.
- Unemployment, practical conditions, 199.
- Unemployment, prevention of, 199.
- UNEMPLOYMENT, PUBLIC CONSTRUCTION AND CYCLICAL, F. G. Dickinson, 175-209.
- Unemployment, shift of workmen, 205.
- United States Bureau of Labor Statistics, 10, 179.
- Variability by Periods, 11.
- Variability, Index of cyclical, 13.

- Variations, Price, 100; seasonal, 100; in supply, 100; in production, 100; raw materials, 101.  
Variations by Groups of Commodities, 10.  
Variations in Crop Yield, 7; causes of, 8.  
Variations in Demand, 8, 9; in sales, 114.  
Variations in Supply, 108; in production, 103.  
Variations, Iron and Steel Production, 102.  
Variations, seasonal; elimination or reduction in, 108.  
Variations, seasonal, remedies, 102, 103.  
Variations, study of, 10.  
VASKIL, W. H., Price Stabilization in Oil Through Control of Production, 80-6.  
Wage-earners, 178.  
Wage Rates, effects of change in, 196.  
Wages, Annual Factory, 178.  
Warehousing Goods, 137.  
Wastes, Controlling, 75.  
Waste in Production, 204.  
WATKINS, MYRON W., Price Stabilization Through Trade Organization and Statistical Cooperation, 44-50.  
Wealth, increased, 126, 127.  
Wealth, shifting of, 146.  
WEIDLEIN, EDWARD R., Industrial Changes Due to Chemistry, 15-33.  
WHITE, CHARLES P., Hand-to-Mouth Buying, 136-45; Industrial Forecasting, 109-25; Shall We Control Demand or Follow It, 126-35; The Causes and Extent of Price Fluctuations, 7-14; The Meaning of Stability, 1-9; The Problem of Seasonal Variation, 100-8.  
Workmen's Compensation Act, 179.

tion  
tical

Due

ring,  
shall  
-35;  
ons,  
The